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Appendix

Biological Assessment for the Arches National Park Transportation Plan and Related Correspondence and Communications

Note: Studies and documents referenced throughout this Transportation Implementation Plan and Environmental Assessment are listed in Chapter 7.



At Arches National Park, the National Park Service (NPS) is proposing to put into action a Transportation Implementation Plan. This plan includes improvements to parking areas and roadside pull offs, traffic calming treatments, motorized interpretive tours, and intelligent transportation system applications. The NPS also will continue to pursue partnerships with local and regional interests, maintain ongoing Visitor Experience and Resource Protection (VERP) program implementation and monitoring, and employ various visitation and congestion management strategies. This action is needed to manage the quality of visitor experiences at many popular attractions in the park, which have deteriorated over time as a result of traffic congestion and crowding at parking areas, trailheads, and popular rock formations.

The Transportation Implementation Plan also includes an integrated environmental assessment prepared pursuant to the National Environmental Policy Act (NEPA). The environmental assessment examines in detail two alternatives: no action and the National Park Service preferred alternative. The preferred alternative proposes implementation of all transportation implementation plan recommendations.

The preferred alternative would have no impacts on paleontological resources, museum collections, floodplains, wetlands, prime and unique farmlands, housing, environmental justice, and geologic resources and hazards.

Short- term negligible adverse impacts could occur to the bald eagle and Southwestern willow flycatcher during construction if these species were using habitats within or adjacent to construction sites. Short- term negligible adverse impacts could also occur to four federally-endangered fish species. Short- term minor adverse impacts would occur to air quality during construction. Short- term negligible adverse impacts would also occur to water quality, wildlife and vegetation, energy and resource conservation, and noise and natural soundscapes. There would be no long- term adverse impacts to threatened

and endangered species, water quality, wildlife and vegetation, energy and resource conservation, and air quality.

Short- and long- term negligible to minor localized adverse impacts would occur to soil resources. Long- term negligible to moderate adverse impacts would occur to biological soil crusts. Short- term negligible to minor adverse impacts would occur to unknown archaeological resources if these resources are discovered during ground disturbance. Short- and long- term negligible to minor adverse impacts would occur to ethnographic resources. Short- term negligible to minor adverse impacts and long- term negligible to moderate adverse impacts would occur to visual quality. Long- term minor adverse impacts would occur to land use.

The preferred alternative would have long- term beneficial impacts on natural resources, cultural resources, transportation and traffic, and visitor use and experience, park operations, and socioeconomics. Proposed improvements at existing pull offs would protect soils and cultural resources from further disturbance and would allow previously disturbed areas to revegetate. Increased use of public motorized interpretive tours could reduce gasoline consumption, air emissions, and vehicular noise by eliminating some private vehicle trips entering the park, particularly during peak periods. The preferred alternative also would enhance traffic safety of park roads and pull offs and would reduce congestion at destination parking areas throughout the park, thereby improving the overall visitor experience. While there would be increased demands in the short term on park staffing and operational resources related to implementation of transportation improvements and monitoring of social pull offs, demands would be reduced over the long term under the preferred alternative. The proposed motorized interpretive tours under the preferred alternative would offer expanded opportunities for the general population to access and experience Arches National Park and enhance the regional economy by providing opportunities for private enterprises.



Project Context

Arches National Park is adjacent to the Colorado River, in high desert country known as the Colorado Plateau. Elevations in the park range from 4,085 to 5,653 feet above sea level. The park contains over two thousand sandstone arches in addition to a variety of unique geological resources and formations such as balanced rocks, fins, and pinnacles. In some areas, faulting has exposed millions of years of geologic history. Throughout the park, rock layers reveal millions of years of deposition, erosion, and other geologic events. Continued erosion in the park influences elemental features such as soil chemistry and water flow pathways.

Arches National Park was first established as a national monument in 1929 and later became a national park in 1971. The 73,359-acre park lies entirely within Grand County, Utah, five miles northwest of the county seat, Moab – a gateway community to the park and other surrounding public lands. Arches National Park is located within the “Grand Circle,” a broad geographic region in the southwestern United States that encompasses more than sixty recreation sites in five states. The Grand Circle includes some of the Southwest’s most unique landscapes, attractions, scenic byways, and national park lands.

This transportation implementation plan and environmental assessment document focuses on transportation conditions and actions within the limits of the park, as well as access to and from the park and the park’s relationship to the gateway community of Moab. The plan also considers the implications of other tourism and recreation destinations on public lands in the region and the importance of a coordinated partnership between the National Park Service and other agencies and jurisdictions in the planning, design, and implementation of regional transportation systems and facilities.

Figure 1.1 on page 1- 3 illustrates the location of Arches National Park as part of the Grand Circle

experience. Figure 1.2 on page 1- 4 illustrates the vicinity of the park and Moab and highlights some of the park’s most popular attractions as well as other recreational sites and lands in the vicinity of the park.

Purpose of and Need for the Plan

The National Park Service is proposing to put into action a transportation implementation plan for Arches National Park. The plan includes selected roadside pull off and parking area improvements, traffic calming measures, motorized interpretive tours, intelligent transportation system applications, and other congestion management strategies.

The purpose of the action is to ease traffic and parking congestion, protect natural and cultural resources, enhance the visitor experience, improve visitor safety and accessibility, and offer visitors an alternative to driving private vehicles through the park. Another purpose of the action is to strengthen the level of coordination and partnerships between the National Park Service and other agencies, jurisdictions, and stakeholders in the region.

The Arches National Park General Management Plan (1989) and Visitor and Resource Protection Implementation Plan (1995) were foundational plans in providing direction for the transportation implementation plan.

Objectives for developing the transportation implementation plan included the following.

- Protect the park’s natural and cultural resources from potential impacts attributable to vehicles and visitor use, including inappropriate parking along roadways and parking lot edges.
- Improve the visitor experience, including enhancement of access and travel mode choices to and within the park.



- Continue to accommodate the private automobile in the park and to enhance the experience of sightseeing and scenic driving.
- Improve traveler safety.
- Integrate park transportation plans with regional transportation planning activities.

The action is needed to address the following problems and needs.

- Parking areas at popular attractions within the park are frequently congested, causing visitors to park outside of paved areas, potentially damaging sensitive soils, vegetation, and cultural resources.
- Visitors have been parking in unpaved areas along the roadside for a variety of reasons (such as for photo stops, orientation, and scenic views), which also can cause potential damage to soils, vegetation and cultural resources.
- Parking conditions, visitor orientation, and recreation opportunities need to be improved and expanded to help better disperse visitation throughout the park.
- Visitor/traveler safety is an important ongoing need that must be addressed throughout the park, including locations along park roads and at key features where travelers tend to exceed posted speed limits and pedestrians frequently cross the road to access trails.
- There is an ongoing need to preserve and enhance the visitor experience at Arches National Park. When parking areas and trails become congested, visitor experience is diminished. An increasing number of visitors are commenting about crowding along trails and at key features and in parking areas and are raising concerns about the potential degradation of natural and cultural resources caused by this congestion.
- Currently, motorized interpretive or sight-seeing tours are not provided to the general visiting public at Arches National Park. There is a need to offer visitors an alternative to driving private vehicles through the park.

- Because the Moab, Utah region, inclusive of Arches National Park and other public lands, is one of the most popular tourism destinations in America, there is an important, ongoing need for the National Park Service, Bureau of Land Management, Utah State Parks, Grand County, City of Moab, and other agencies and stakeholders to coordinate and cooperate on planning for and addressing regional transportation issues over the near and far term.

This transportation implementation plan focuses on various strategies and improvements that could be reasonably implemented within approximately the next six years or less to address these needs.

The environmental assessment integrated with this transportation implementation plan was prepared pursuant to the National Environmental Policy Act (NEPA) of 1969 and regulations of the council on Environmental Quality (40 CFR 1508.9), the National Park Service's Director's Order (DO)- 12 (*Conservation Planning, Environmental Impact Analysis, and Decision-making*), and the National Historic Preservation Act of 1966 (as amended).

Additional environmental analysis and NEPA compliance may be needed to support specific implementation of motorized interpretive tours since the physical aspects outside the park related to this action have only been generally defined in the plan.

Purpose and Significance of the Park

The Arches National Park Visitor Experience and Resource Protection (VERP) Implementation Plan, published in 1995, describes the purpose and significance of the park based on the park's enabling legislation, legislative history, NPS policies, park plans, public input, and the knowledge and insights of NPS staff. According to the VERP Implementation Plan, the purposes of Arches National Park are to:

- protect extraordinary examples of eroded sandstone formations and the setting in which they occur;



Figure 1.1 – Regional Map

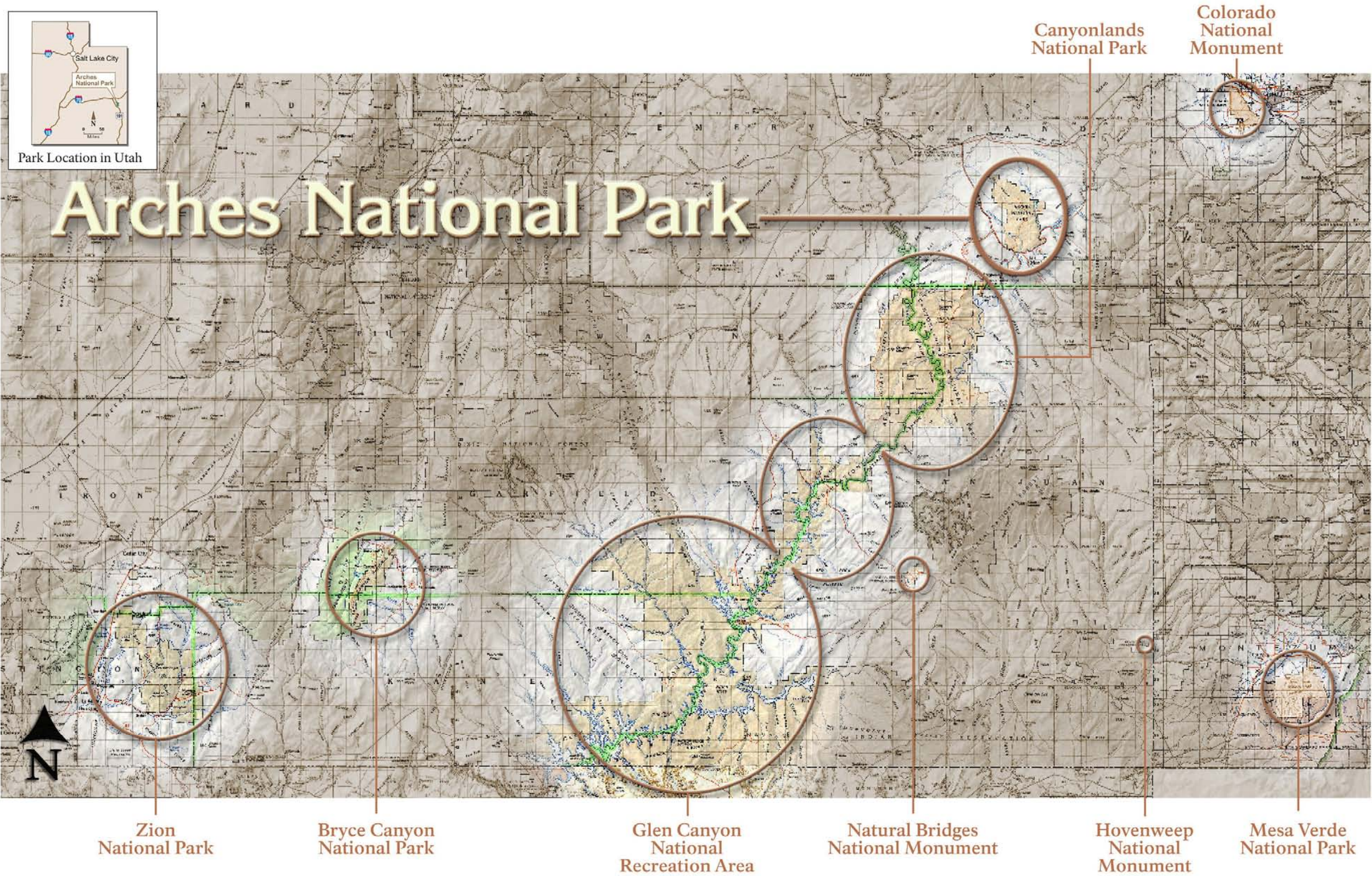
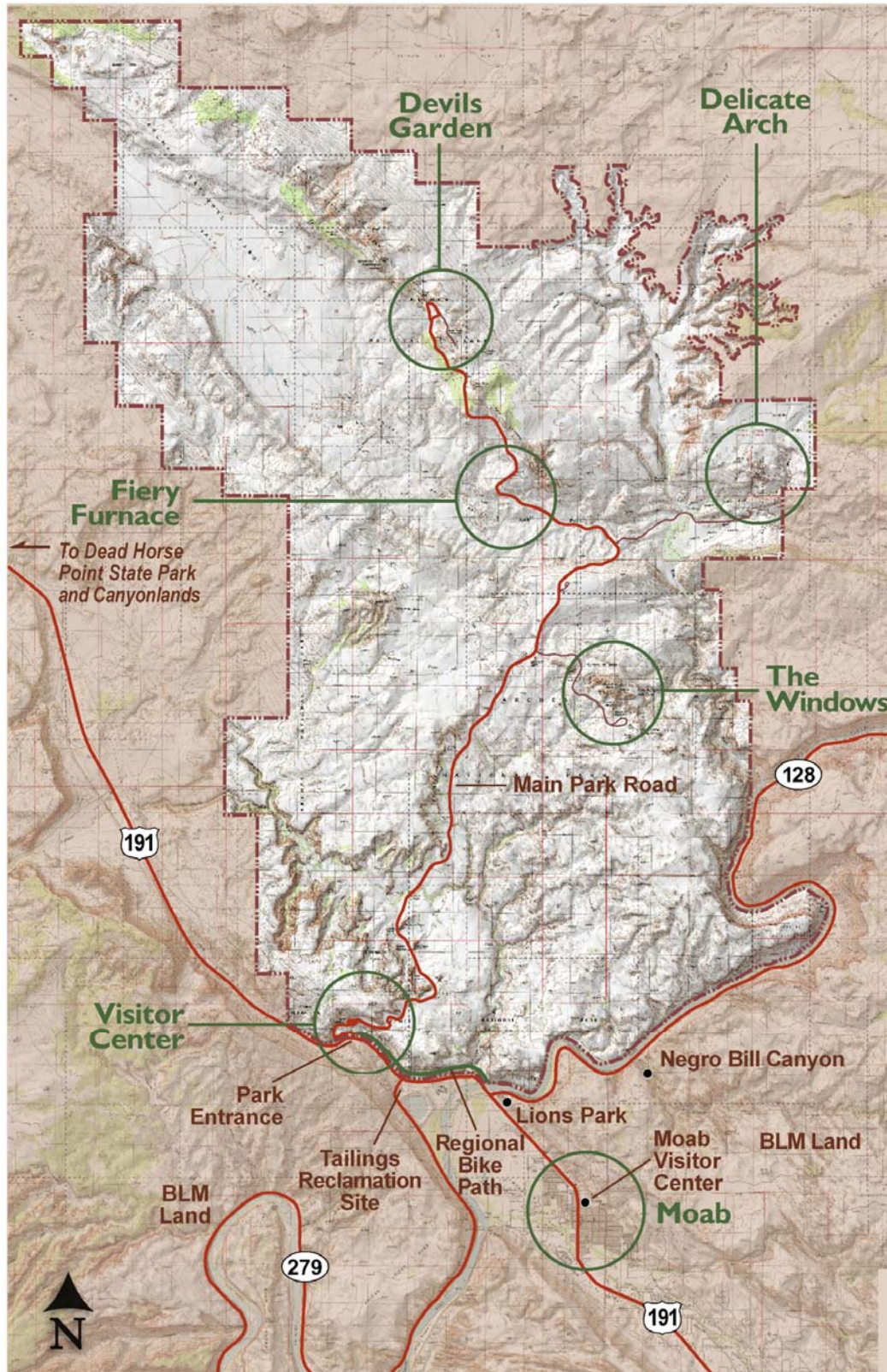


Figure 1.2 – Park Map



- protect other features of geological, historical, prehistorical, and scientific interest, and
- provide opportunities for visitor appreciation and education that leave park resources unimpaired.

Several factors contribute to the significance of Arches National Park. The park contains the largest concentration of natural arches in the country and one of the largest concentrations in the world. Its extraordinary geological features are easily accessible, many by vehicle or short walking distances from trailhead parking areas.

Arches National Park has striking foreground and background views created by contrasting colors, landforms, and textures. The juxtaposition of shale, gypsum, and sandstone substrates within this protected area provides unusual research opportunities. The park preserves a portion of the Colorado Plateau ecosystems, which have unusual nutrient and energy cycles, offering unique opportunities for studying protected ecosystems and environmental changes over long periods.

Arches National Park also contains cultural resources that are listed on or eligible for the National Register of Historic Places, and the park contains part of the most concentrated dinosaur megatrack site in the world.

The park is part of a complex of surrounding parks and public lands offering millions of acres of access and a wide range of recreation opportunities and experiences to regional, national, and international visitors.

In accordance with the overall mission of the National Park Service, the Arches National Park General Management Plan (GMP), published in 1989, states that *“protection and preservation of the natural environment to ensure ecosystem integrity while providing for visitor enjoyment will be the principal consideration.”*

Previous Planning Efforts

Following is a chronological summary of planning efforts relevant to transportation issues at Arches National Park. These documents were referenced

as background information for development of the transportation implementation plan.

Early Transportation Planning (1970s)

Transportation planning involving Arches National Park dates back at least as far as the early 1970s. In 1973, a regional transportation study analyzed existing transportation conditions and proposed actions to strengthen interconnectivity and intraconnectivity between Arches, Canyonlands, and Capitol Reef national parks. Proposals resulting from the study ranged from plans for expansion of regional roadway systems to development of a three- park regional transportation system involving air and bus transit coordination. Specific to Arches National Park, the study noted:

“Arches, by virtue of its physiographic characteristics – its broad, open areas with concentrated segments of erosional forms – lends itself well to the existing automobile- oriented experience. The movement of visitors between points of interest in Arches is provided by a paved entrance road that extends nearly 18 miles into the park, and a series of connecting roads and trails. In order to cope with future increases in visitation, a system of mini transit vehicles similar to that proposed for Canyonlands will be implemented when park management deems it necessary.”

Arches National Park General Management Plan (1989)

The Arches National Park GMP established an overall direction for management and use of the park. The GMP proposed improvement and expansion of some visitor and administrative facilities at the park to:

- 1 Remove people and property from the 500- year floodplain,
- 2 Correct traffic hazards along the main park road,
- 3 Provide adequate visitor orientation and information,
- 4 Meet the existing demand for parking at most overlooks and trailheads,



- 5 Confine the impacts of vehicle and foot traffic,
- 6 Make the Delicate Arch viewpoint accessible to all visitors, and
- 7 Rectify miscellaneous visitor use, resource management, and operational problems.

Some of the specific topics addressed by the GMP include analysis of visitor capacity, interpretive signing, accessibility for all park visitors, visitor center development, flooding hazards, treatment and storage of artifacts, and issues related to adjacent lands. Many of the recommendations of the GMP have been implemented, including expansion and improvement of the Visitor Center, Devils Garden, Balanced Rock, Wolfe Ranch, and the Delicate Arch Viewpoint parking lots. Other recommendations have not yet been implemented, such as the expansion of the Sand Dune Arch parking lot.

The GMP included an environmental assessment (EA) of the plan's recommendations. Three alternatives were reviewed in the GMP/EA: the preferred alternative, a no- action alternative, and a minimum requirement alternative (only improvements needed for life safety and resource protection). The preferred alternative development plan included flood mitigation, improvements to existing and development of new visitor facilities and services (interpretation, trails, and trailheads), and improvements to existing roads.

The preferred alternative was favored during the public comment period. The EA determined that the preferred alternative would not have an appreciable effect on the human environment or impacts on public safety, threatened species, or other unique characteristics in the park. The results of the analysis determined that an environmental impact statement would not be required for the alternatives in the GMP.

The 1989 GMP provided a limited assessment of transportation conditions and needs at Arches National Park, primarily focused on defining parking lot capacities and improving operations of park roads and trails. The GMP highlighted the urgent need for managing increasing visitor and vehicle traffic and congestion in the park. It called

for the development of a visitor impact management program to address impacts on natural and cultural resources and visitor experience. The GMP stated: *"To gather the necessary data for decisions on capacity, a visitor impact management (VIM) program will be implemented."* Without making specific decisions on carrying capacity or alternative transportation systems, the GMP anticipated that the visitor impact management program would make recommendations for changes in the way park visitors and their vehicles are managed.

The GMP identified "Options Considered but Rejected," one of which was to "Implement a Public Transportation System." Implementation of a public transportation system was studied as a possible alternative to expanding parking at interpretive viewpoints. The study concluded that public transportation would be quite costly and might not be economically feasible for Arches National Park.

Visitor Experience and Resource Protection Program and Implementation Plan (1990s)

For much of the 1990s the National Park Service (NPS) was involved in a planning process designed to address the agency's requirement to include visitor carrying capacity considerations in all general management plans. The NPS developed the Visitor Experience and Resource Protection (VERP) program to address carrying capacity and help parks make sound decisions about visitor use.

The VERP program interprets carrying capacity as a prescription of desired ecological and social conditions rather than a prescription of numbers of people. VERP provides support for informed, defensible decisions about visitor use and provides a framework for cost- effectively coordinating planning, research, monitoring, and management actions.

Arches National Park was selected in 1992 as the first park to test the VERP process. The park then developed and published a VERP Implementation Plan in 1995. Development of the VERP plan for



Arches tiered from the 1989 GMP and Environmental Assessment, which identified an urgent need for a visitor impact management program at the park.

The Arches National Park VERP Implementation Plan includes four primary elements:

- management zoning scheme
- indicators and standards for each zone
- management actions to address visitor use, and infrastructure in each zone
- monitoring program.

The park is divided into nine management zones. Each zone contains indicators and standards for monitoring desired visitor experience and resource conditions. Specific methodologies were developed for monitoring since monitoring is a key element of the VERP program. Ongoing collection of up- to- date data on resource conditions and visitors ensures the ability of park staff to determine if discrepancies occur between desired and existing conditions.

In addition to developing the VERP Implementation Plan, park staff began the process of installing improvements at key feature parking areas to help reduce roadside parking in undesignated areas and to maintain acceptable resource and crowding conditions at these locations consistent with the standards in the VERP plan. Elements such as striping, signs, curbing, fencing, and boulders were placed in key feature and trailhead parking areas to physically manage parking and roadside pull off activities in these areas.

A review of the monitoring results between 1998 and 2003 for three key features that are a focus of this transportation implementation plan (the Windows, Delicate Arch, and Devils Garden) indicates the following:

- In 1998, conditions at all three areas were within the VERP standards. In 1999, Delicate Arch conditions failed to meet the standards.
- In 2000 and 2001, conditions at Delicate Arch and Windows failed to meet the standards.

- In 2002 and 2003, conditions at Delicate Arch and Devils Garden failed to meet standards.

Funding for ongoing VERP monitoring at Arches National Park is not guaranteed. However, VERP monitoring is an extremely important tool for management of visitor experience and resource protection. Ongoing VERP monitoring would help park staff to determine where and when various strategies for reducing congestion in the park would be implemented.

Alternative Transportation Needs Study (1999)

Section 3039 of the Transportation Equity Act for the 21st Century (TEA- 21) required the Secretary of Transportation, in coordination with the Secretary of the Interior, to: *“undertake a comprehensive study of alternative transportation needs in national parks and related federal lands.”* The results of the Federal Lands Alternative Transportation Systems (ATS) study identified major transportation needs at sites managed by the National Park Service (NPS), the Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS).

During the summer of 1999, Arches National Park participated in the study, administered by the Federal Transit Administration in cooperation with the Federal Highway Administration. A contractor team visited the park and Moab, gathered information on park infrastructure, planning documents and community resources, and met with park staff and community leaders to discuss the potential for an Alternative Transportation System (ATS) concept. The ATS concept included consideration of potential shuttle bus services to and from and within the park. Community representatives were supportive of the ATS concept and expressed interest in working with the National Park Service on future planning and implementation activities. The 3039 Alternative Transportation Needs Study determined that the park was a strong candidate for the introduction of an ATS.



Arches National Park Road Pullout Analysis Report (2001) and Updated Social Pull Off Study (2004)

For many years, visitors have been parking their vehicles on roadside shoulders throughout the park, which causes potential damage to the road edge, sensitive soils, vegetation, and cultural resources. This “social” pull off activity has become a widespread problem throughout the park. In locations where the shoulders have not been paved or delineated to support vehicles pulling off the road, informal pull offs are being created that are often wider and longer than needed, and damage to soils and vegetation occurs regularly. In addition to the effects on natural resources, the locations of many of the social pull offs compromise traffic safety and visitor experience.

As part of VERP- related project funding provided by the Natural Resource Preservation Program (NRPP), a detailed assessment of the informal road shoulder parking or social pull off conditions was conducted. The resulting study, published in March 2001, involved a survey of roadside conditions and identified and classified 177 informal pull off locations. Some locations were recommended for formalizing (improving for permanent use). Others were recommended for removal (closure and treatment to discourage continued social pull off activities).

An updated analysis of existing formal and social roadside pull off areas was completed November 2- 5, 2004 at Arches National Park by park staff and transportation planning consultants. The number of pull off locations had grown from the 177 originally analyzed in the 2001 study to over 200 in the park, and park management staff felt it was time to move forward with closing and treating pull off locations to help deter more from being created. The team assessed all the pull off recommendations in the 2001 study, as well as additional pull offs created since that time and more current considerations and recommendations offered by Arches National Park staff.

Of the all the social pull off locations in the park, the 2004 study determined that twenty- one should be formally improved to include paving, fencing, advanced signing, and treatment of disturbed adjacent landscape pending the outcome of detailed environmental analysis. The study also determined that five locations should receive minor improvements, remaining in their current condition and open to use, but not paved or formalized. The study determined that other remaining pull off locations throughout the park could be treated over time to deter usage. Treatment could include raking out tire treads and depressions caused by social pull off activity, restoration with native vegetation, and edging areas with large boulders, and may also include soil restoration, fencing, and other treatments where needed.

Intelligent Transportation Systems Study, Arches National Park (2004)

Intelligent Transportation Systems (ITS) include the application of computers, communications, and sensor technology to multi- modal transportation systems and facilities. When integrated into the transportation system infrastructure, and in vehicles themselves, these technologies help monitor and manage traffic flow, reduce congestion, provide alternate routes to travelers, enhance productivity, and save lives, time, and money.

A study of potential ITS applications suitable for Arches National Park was completed in 2004. The study proposed short- term and long- term ITS improvements for the park. The short- term proposals of the ITS study are part of the collective actions proposed in the transportation implementation plan. Potential long- term options require further study prior to implementation. Additional study and analysis of these elements likely would be included as part of a future update to the park’s GMP, and as such, the long- term options are not analyzed here.



Issues and Impact Topics

Issues

Issues describe problems or concerns associated with current impacts from environmental conditions or current operations, as well as problems that may arise from the implementation of any of the alternatives. Potential issues related to the transportation implementation plan were identified and discussed during agency and public scoping meetings, other public meetings, and National Park Service working group meetings. The primary concern of the park is to protect and minimize disturbance to natural and cultural resources, enhance the visitor experience, and improve visitor safety and accessibility. Other issues and concerns identified include:

- **Natural Resources.** Continued social pull off and parking activity and visitor congestion and proposed pull off and parking area improvements likely will affect natural resources such as biological soil crusts. Impromptu parking along park roads and social trails created in the vicinity of these areas has and will continue to affect soils and vegetation.
- **Cultural Resources.** Continued social pull off and parking activity and visitor congestion and proposed pull off and parking area improvements could affect a variety of cultural resources at the park, including plants collected for ethnobotanical purposes.
- **Visitor Use and Experience.** Continued congestion and overcrowding at key park features could affect visitor experience and proposed actions of the transportation implementation plan also could affect visitor experience. General motorized interpretive tours have not yet been provided at the park.
- **Visual and Scenic Quality.** Continued social pull off use and creation of social trails in the vicinity of these areas, as well as proposed parking and pull off improvements, have the potential to affect the visual and scenic quality and views of the resources for which the park was established.

- **Health and Safety.** Visitors frequently speed on the main park road and pedestrians cross the main road at several locations to access trailheads. The park must ensure visitor safety and traffic safety within the park.
- **Traffic and Transportation.** Ongoing traffic and parking area congestion could continue, and existing transportation facilities (roads and parking areas) may not adequately support future visitor needs. There is currently a lack of opportunity for visitors to experience the park other than by private vehicle.
- **Park Operations.** Considerable levels of park staffing and resources are currently devoted to traffic, parking, and social pull off management. There may be an opportunity to reduce the demand for staffing and resources for these purposes, and then to redirect staffing and resources to important needs such as visitor interpretation and education and resource protection.
- **Socioeconomics, Regional Partnerships and the Gateway Community.** The City of Moab serves as the gateway community to the park. Opportunities for the park to collaborate with the City of Moab, Grand County, and other regional interests (such as the Bureau of Land Management and Utah State Parks) are ongoing. Motorized interpretive tours, if implemented, would originate in Moab, which could have positive affects on the local economy and strengthen the town's function as a gateway to the park. Development and construction of facilities to support tour operations could temporarily affect the town in both positive and negative ways.

Derivation of Impact Topics

Impact topics were identified in order to focus the analysis of impacts on resources and the potential consequences of the proposed actions of the transportation implementation plan in relation to the no action alternative. Impact topics were based on legislative requirements; topics specified in the *Reference Manual to Director's Order 12* (USDI National Park Service 2001a); environmental statutes, regulations, executive



orders and *NPS Management Policies* (USDI National Park Service 2001b); park-specific resource information; and concerns raised during project scoping.

As the transportation implementation plan was further developed and refined, the National Park Service determined that some of the issues did not need to be carried forward as impact topics for detailed analysis because the impacts anticipated under any of the alternatives would not exceed negligible or minor adverse levels. However, some impact topics (transportation and traffic, visitor use and experience, park operations, and socioeconomics) were carried forward due to the potential for positive effects and/or their specific relationship to the transportation implementation plan. Issues identified as impact topics to be carried forward in the environmental impact analysis are presented below under “Impact Topics Selected for Detailed Analysis.”

Impact Topics Selected for Detailed Analysis

Topics carried forward as impact topics in this transportation implementation plan and environmental assessment are presented below. Brief explanations of the reasons for selection of the specific impact topics are provided.

Soils and Biological Soil Crusts

The *NPS Management Policies* (USDI National Park Service 2001b) Section 4.8.2.4 relating to Natural Resource Management Guidelines for soil resources management states that the National Park Service will actively seek to understand and preserve the soil resources of parks and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.

Continued use of social pull offs under Alternative A and planned construction activities under Alternative B could result in potential loss of sensitive biological soil crusts. The natural recovery of soil crusts can take many years. Therefore, soils and biological soil crusts are analyzed in detail in this document.

Visual Resources

In accordance with the *NPS Management Policies* (2001), the NPS strives to integrate facilities into the park landscape and environs with sustainable designs and systems to minimize environmental impact (sec. 9.1.2.1). When large parking areas are planned, *NPS Management Policies* (sec. 9.2.5) state that appropriate plantings and other design elements will be used to reduce negative visual and environmental impacts. In addition, in accordance with *NPS Management Policies* (2001), the NPS strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human caused light.

Both alternatives could have impacts on visual resources. Therefore, potential impacts on visual quality and night skies are analyzed in detail in this document.

Visitor Use, Visitor Experience, and Recreation Resources

The *NPS Management Policies* (2001) state that the NPS has the responsibility to promote and regulate appropriate use of the parks and provide services necessary to meet the basic needs of park visitors and achieve each park’s goals. The park’s Visitor Experience and Resource Protection Plan and General Management Plan also contain guiding principles related to the need to provide for enjoyment of the park balanced with resource preservation and management goals.

Both alternatives could affect visitor use, visitor experience and recreation resources of the park, and therefore are analyzed in detail in this document.

Traffic and Transportation

In accordance with the *NPS Management Policies* (2001), the NPS strives to protect human life and provide a safe and healthful environment for visitors and employees. The policies state that management decisions regarding transportation facilities require consideration of alternatives and understanding of their consequences. The policies



also address NPS responsibilities to provide accessibility for persons with disabilities

Both alternatives could have potential effects on traffic and transportation conditions within and immediately surrounding the park and as such, traffic and transportation are analyzed in detail in this document.

Park Operations

The *NPS Management Policies* (2001) recognize that there is a maintenance responsibility and cost for every asset administered by the NPS. The policies state that the NPS will provide a safe, sanitary, environmentally protective and aesthetically pleasing environment for park visitors and employees; protect the physical integrity of facilities; and preserve or maintain facilities in their optimum sustainable condition to the greatest extent possible.

Because both alternatives could affect park operations, the topic is analyzed in detail in this document.

Socioeconomics

NEPA provisions require environmental analysis to consider potential impacts of socioeconomic conditions related to employment, occupation, income, housing, and tax base.

The local economy of the Grand County area may be affected by both alternatives, and as such the topic of socioeconomics is analyzed in detail in this document.

Land Use Planning

In accordance with the *NPS Management Policies* (2001), park planning helps define which types of resource conditions, visitor experiences, and management actions will best achieve the mandate to preserve resources unimpaired for the enjoyment of future generations. The policies also acknowledge the responsibility of the NPS to cooperatively plan with gateway communities and surrounding jurisdictions. The park's GMP also includes provisions related to planning and management of park resources and cooperation with regional and community interests.

Because the alternatives have the potential to affect planning and management decisions within the park and at the local level, potential impacts related to land use plans and policies are analyzed in detail in this document.

Impact Topics Dismissed from Detailed Analysis

According to the CEQ "Regulations for Implementing the National Environmental Policy Act" (40 CFR Part 1500-1508) and NPS Policy (*Director's Order 12*), certain topics may be eliminated from detailed analysis if the expected adverse impacts would be negligible to minor with implementation of required mitigation. The following topics were eliminated from further analysis in this document for the reasons stated under each below.

Geologic Resources and Hazards

NPS Management Policies (2001) (USDI National Park Service 2001b) Section 4.8.1 requires NPS to allow natural geologic processes to proceed unimpeded. NPS can intervene in these processes only when required by Congress to save human lives, or there is no other feasible way to protect other natural resources, park facilities, or historic properties. Section 4.8.2 requires the NPS to protect geologic features from adverse effects of human activity.

The alternatives evaluated in this document would not result in impacts to geologic resources or hazards. Although ground-disturbing activities are anticipated under Alternative B, they would occur within and adjacent to previously disturbed areas such as roadways and designated visitor facilities and parking lots, which are not known to contain unique geologic features. Construction activities would only affect previously disturbed geologic features or geologic hazards. No problems with landslides, rockfall, or other geologic hazards have been experienced to date at existing and proposed improvement sites such as parking lot and pull off locations. Also, the Moab Fault has not been active in historic times and poses little risk to the project components associated with the transportation implementation plan. For these reasons, the topic



related to geologic resources and geologic hazards has been dismissed as an impact topic in this document.

Water Quality

The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. *The NPS 2001 Management Policies* provide direction for the preservation, use and quality of water in national park units.

Although the potential for sedimentation exists with both alternatives, sediment controls would be implemented consistent with National Park Service design standards. There is the potential for some limited sedimentation during construction of improvements associated with Alternative B. However, use of construction best management practices to control erosion would ensure that any effects on surface waters would be short- term and negligible. The improvements and activities proposed under the alternatives would not be located near or impact navigable streams or fisheries.

Alternative B proposes long- term reclamation of approximately 150 existing social pull offs in the park, whereby 4.4 acres of currently impacted area would be returned to a more natural condition. Proposed physical modifications and treatments designed to keep visitors on trails, reduce the number and size of social pull offs, and to prevent overflow parking would improve water quality in localized areas by reducing soil disturbance, loss of vegetation, and the volume and intensity of surface runoff. These actions would have a long-term beneficial impact on water quality. For these reasons, water quality has been dismissed as an impact topic in this document.

Floodplains

Executive Order 11988, Floodplain Management (Federal Register 1977a), and NPS *Director's Order 77- 2, Floodplain Management* (USDI National Park Service 2003) requires an

examination of impacts on floodplains and the potential risk involved in placing facilities within floodplains. Certain construction within a 100- year floodplain requires preparation of a Statement of Findings. After review of the alternatives, it was determined that proposed actions would not be affected by flooding and that project implementation would not impact the 100- year or 500- year (regulatory) floodplains. Therefore, floodplains were dismissed as an issue topic in this document.

Wetlands

Executive Order 11990, Protection of Wetlands (Federal Register 1977b) requires an examination of impacts on wetlands and protection of wetlands. The *NPS Management Policies 2001* (USDI National Park Service 2001b) and the *Reference Manual to Director's Order 12* (USDI National Park Service 2001a) require federal agencies to avoid, where possible, adversely impacting wetlands. Wetlands are areas that are inundated or saturated by surface or groundwater often enough and long enough to support a prevalence of vegetation typically adopted for life in saturated soil conditions. According to the park's GMP, wetlands are limited to areas adjacent to seeps and springs and along streams. None of the areas proposed for physical disturbance are located near these resources. In addition, based on an aerial photo review of all proposed construction sites, no wetlands were identified. Therefore, these resources would not be affected by the alternatives and Wetlands was dismissed as an impact topic.

Wildlife and Vegetation

The NPS Organic Act directs parks to conserve wildlife unimpaired for future generations and is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of the park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise they are protected from harvest, harassment, or harm by human activities.

According to *NPS Management Policies 2001*, the restoration of native species is a high priority (sec.



4.1). Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals.

Under Alternative A, the No Action alternative, disturbance to existing wildlife populations and habitats in the park at social pull offs and at other major visitor destinations from human activity would continue. These ongoing activities however, in combination with measures to mitigate wildlife impacts contained in the park's GMP (USDI National Park Service 1989), would continue to result in minor impacts on these resources.

Construction activities proposed under Alternative B that would occur outside of existing roadways, parking lots, and other previously disturbed areas would result in some displacement of wildlife and vegetation communities. Vegetation currently found in areas proposed for roadside pull off and parking lot improvements, including native grasses and shrubs, would be removed wherever soil is disturbed. Although impacts on wildlife and vegetation would be detectable due to displacement and habitat removal, they would be localized (concentrated in areas of proposed construction). Effects on individuals of a given species would not have an adverse impact on overall park- wide populations. Furthermore, alternate habitat for these species is available throughout the park. Removal of vegetation would not adversely affect the viability or relative abundance of any vegetation species. Therefore, short- term, adverse impacts would be negligible.

Construction and rehabilitation activities also would be expected to cause short- term negligible adverse impacts on aquatic habitat. During construction, there would be some limited potential for soil erosion and sedimentation to occur that could indirectly affect aquatic habitat in the park's perennial streams. Use of construction best management practices to control erosion would ensure that any effects on surface waters and their associated aquatic habitat would be negligible. Nearly all construction activities would occur in areas that have already been heavily

disturbed. In addition, Alternative B would include efforts to restore approximately 191,664 square feet (4.4 acres) of previously disturbed habitat in areas currently used for social pull offs, and approximately 18,095 square feet of existing paved parking areas at The Windows, Sand Dune Arch Trailhead, and Devils Garden parking areas would be removed and the landscape would be rehabilitated to enable a return to its natural condition. These habitat rehabilitation efforts would have a beneficial impact resulting from a long- term net increase in habitat area. For these reasons wildlife and vegetation have been dismissed as impact topics in this document.

Threatened and Endangered Species

The 1973 Endangered Species Act, as amended, requires an examination of impacts on all federally listed threatened or endangered species. NPS policy requires examination of the impacts on state listed threatened or endangered species and federal candidate species.

For purposes of Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS), the impact assessments presented below for federally listed species also include a concluding statement as to whether the alternative would have “no effect,” “may affect but is not likely to adversely affect,” or “may affect and is likely to adversely affect” any federally listed species. Review of this impact analysis and the Biological Assessment (submitted under separate cover to the USFWS) is intended to serve in support of the Section 7 consultation process.

A review of literature, park records, and other available resources (USDI National Park Service 2004a, Utah Division of Wildlife Resources [UDWR] 2005a, b, Utah Native Plant Society 2004) current as of October 8, 2005 indicates that the park supports one federal threatened bird species, the bald eagle (*Haliaeetus leucocephalus*), and the following five federal endangered species:

- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- bonytail chub (*Gila elegans*)
- Colorado pikeminnow (*Ptychocheilus lucius*)



- humpback chub (*Gila cypha*)
- razorback sucker (*Xyrauchen texanus*)

The USFWS has designated the floodplain and the Colorado River segment adjacent to Arches National Park as critical habitat for Colorado pikeminnow and razorback sucker (U.S. Fish and Wildlife Service 2005a). This includes the Colorado River and the confluences of Courthouse Wash and Salt Wash where the spring floods of the Colorado back up into those tributaries. The boundaries of these critical habitats, however, are outside of the area (several miles) that could be affected by the transportation implementation plan (USFWS, Valdez, pers. comm. 2005b).

According to the USFWS Biologist Larry England, there are no listed plants of concern with regard to the transportation implementation plan. One listed plant species, *Cycladenia jonesii*, has been found in riparian areas around the Colorado River outside the park, but has not been found within the park (NPS, Schelz, pers. comm. to Wood, 2006). In any case, Colorado River riparian areas are away from the road system and would not be affected by actions in this plan.

Under Alternative A, the No Action alternative, currently planned improvements and operation and maintenance activities in the park would continue as authorized under the existing GMP. Disturbance levels to threatened and endangered species would not be expected to change substantially from existing conditions. Continuation of current activities under this alternative, in combination with measures to mitigate threatened and endangered species impacts contained in the park's GMP would result in minor long- term impacts on threatened and endangered species. Therefore, the NPS has determined that Alternative A would have "no effect" on threatened and endangered species.

Under Alternative B, noise and other activities undertaken during construction and rehabilitation of existing and new parking areas may have a short- term adverse impact on ground- dwelling wildlife by causing animals to avoid project areas. This impact would be minor

for bald eagles and willow flycatchers, however, because these species likely avoid these sites already disturbed by park visitors that use these areas. Long- term effects would result from the net loss of a small amount of potential habitat (6,300- 9,300 square feet) that may displace burrowing and ground- nesting species. For bald eagle foraging, the affected area is insignificant compared to the remainder of alternate habitat available throughout the park. Therefore, effects to bald eagles would be negligible. The areas of disturbance are not near potential willow flycatcher habitat (riparian vegetation). Use of construction best management practices to control erosion would ensure that any effects on surface waters and their associated fish habitat would be negligible.

Noise and other activities undertaken during construction and rehabilitation of proposed roadside pull offs in the park may have a short- term adverse impact on ground- dwelling wildlife by causing animals to avoid these areas. This impact would be minor, however, because it would not have a principal effect at the population level on wildlife resources and habitat. Bald eagles would not be appreciably affected during construction because of the dispersed distribution of construction sites throughout the park, the fact that the majority of these sites are already disturbed and subject to human activity, and represent an insignificant fraction of the total foraging habitat. None of the roadside pull off sites is close to potential willow flycatcher habitat.

Long- term adverse impacts at pull off areas would result from loss of a small amount of habitat (1,875 square feet) for burrowing and ground- nesting species that potentially could be used as forage for bald eagles. However displaced habitat is already heavily disturbed. Although impacts on wildlife would be detectable due to displacement and habitat removal they would be localized (concentrated in areas of proposed construction). Effects on individuals of a given species would not have an adverse impact on overall park- wide populations. Furthermore alternate habitat for these species is available throughout the park. Therefore impacts would be minor.



Construction and rehabilitation of roadside pull offs would have negligible effects on listed fish. No fill material would be placed in or removed from any surface waters and no in- water activities would be required for construction in the pull off areas. During construction, there would be some limited potential for soil erosion and sedimentation to occur that could indirectly affect fish habitat in the park's perennial streams. Areas of improvement that are located in the vicinity of the park's two perennial streams include pull offs 4 and 21 (near Courthouse Wash), proposed to be formalized for permanent use. However, use of construction best management practices to control erosion would ensure that any effects on surface waters and their associated listed fish habitat would be negligible. Furthermore, there are no surface waters such as streams or channels in the construction limits of pull off areas. There would be a decrease in total impervious surface area with full project implementation (up to 4.4 acres of restoration). Thus, short- term impacts on fish species would be negligible.

A centralized operation and maintenance facility to support motorized interpretive tours is proposed for development in Moab. Although the type and magnitude of impacts to fish, wildlife, and habitat would depend on the specific site location, impacts are expected to be short- term and range from negligible to minor if construction complies with City of Moab policies and regulations governing the protection of wildlife habitat. Consultation with USFWS pursuant to Section 7 of the ESA would be prepared by the National Park Service for the identified facility site in Moab if this plan component is determined to be a federal undertaking.

Other proposed transportation implementation plan activities such as traffic calming measures, ITS, partnerships with regional interests, and visitation and congestion management would result in negligible impacts on fish, wildlife, or habitat.

The NPS has determined that Alternative B “may affect, but would not likely adversely affect” the bald eagle, southwestern willow flycatcher, bonytail chub, Colorado pikeminnow, humpback chub, or razorback sucker. The NPS has further

determined that Alternative B “may affect, but would not likely adversely” modify the designated critical habitats of the Colorado pikeminnow and razorback sucker. Therefore, impacts on special status species are not further analyzed in this document.

Cultural Resources and Section 106 of the National Historic Preservation Act

This environmental assessment describes potential impacts to cultural resources consistent with the regulations of the Council on Environmental Quality (CEQ) that implement NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA).

In accordance with regulations of the Advisory Council on Historic Preservations that implement Section 106 of the NHPA (36 CFR part 800), impacts to archaeological resources, historic structures, cultural landscape, and ethnographic resources were identified and evaluated by 1) determining the area of potential effects (APE); 2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; 3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register, and 4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either adverse effect or no adverse effect must be made for affected National Register- eligible cultural resources. An adverse effect occurs whenever an impact alters any characteristic of a cultural resource that qualifies it for inclusion in the National Register. Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.



CEQ regulations and the National Park Service's Director's Order 12 also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g., from moderate to minor or negligible, etc.). However, any reduction in intensity of impact due to mitigation is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

Cultural resources include archaeological resources, ethnographic resources, historic structures, museum collections, and cultural landscapes. Numerous legislative acts, regulations, and National Park Service policies provide direction for the protection, preservation, and management of cultural resources on public lands. Applicable laws and regulations include the National Park Service Organic Act (1916), the Antiquities Act of 1906, the National Historic Preservation Act of 1966 (1992, as amended), NEPA, the National Parks and Recreation Act of 1978, the Archaeological Resources Protection Act of 1979, the Native American Graves Protection and Repatriation Act of 1990, and the Curation of Federally Owned and Administered Archaeological Collections (1991). Applicable agency policies relevant to cultural resources include Chapter 5 of *NPS 2001 Management Policies*, and Director's Order — 28: *Cultural Resource Management*, as well as other related policy directives such as the National Park Service *Museum Handbook*, *National Park Service Manual for Museums*, and *Interpretation and Visitor Services Guidelines* (NPS- 26).

The Arches National Park archaeologist completed a Section 106 assessment for the proposed Transportation Implementation Plan on March 15, 2005. The field survey of each of the proposed pull off locations and parking areas did not identify any cultural resources within the project APE (NPS, Chris Goetze, Archaeologist, Arches National Park, telephone conversation with Lara Rooke, Cultural Resource Specialist, AMEC/Shapiro and Associates, March 30, 2005).

The 1995 Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers states that "repaving of existing roads or existing parking areas within previously disturbed areas may be reviewed internally by the National Park Service for Section 106 purposes, without further review by the Advisory Council or the State Historic Preservation Offices." Arches National Park has determined that based upon the results of their field survey there would be no effect to cultural resources under the alternatives for activities undertaken within the park. Therefore, cultural resources have been dismissed as an impact topic in this environmental assessment.

Construction of a centralized operation and maintenance facility in Moab to support motorized interpretive tours could result in impacts on cultural resources. The intensity of effect from this facility would depend on the nature and integrity of the affected resource. Proposed mitigation includes a survey of the site prior to construction, consideration of alternative sites and/or designs to avoid or minimize impacts to resources, if present, and compliance with state and local historic preservation laws and regulations. Implementation of these measures would ensure that short- term adverse impacts on cultural resources, including archaeological resources, ethnographic resources, and historic structures and cultural landscapes, would be negligible to minor. A Section 106 assessment would be prepared by the National Park Service for the identified facility site in Moab if this plan component is determined to be a federal undertaking.

Should previously unknown cultural resources be encountered during construction activities, work would be halted in the discovery area and the park would consult according to 36 CFR 800.13 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990.

Museum Collections

NPS Management Policies (USDI National Park Service 2001b) and *NPS Director's Order 28, Cultural Resource Management Guideline* (UDSI



National Park Service 1998) require the consideration of impacts on museum collections (archaeology, ethnology, history, biology, paleontology, geology and archives) as a subtopic of Cultural Resources. The Arches National Park museum collection would not be affected by the proposed alternatives, another reason Cultural Resources were dismissed as an impact topic.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. The lands comprising the park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, Indian trust resources have been dismissed as an impact topic in this environmental assessment.

Paleontological Resources

There would be no measurable impact to or loss of fossils at Arches National Park under either of the alternatives because activities would occur in geologic layers not known to contain extensive fossils, and the volume of bedrock disturbance would be negligible. Therefore, paleontological resources were dismissed as an impact topic.

Energy and Resource Conservation

Energy would be directly expended during construction activities necessary under either alternative. However, this expenditure of energy would be short- term, negligible, and adverse. Short- term energy expenditures would be offset by long- term energy savings associated with the proposed actions of the transportation implementation plan. Proposed motorized tours could reduce the number and types of private vehicles entering the park, thereby reducing overall levels of fuel consumption. The type of

vehicle chosen for tours in Arches National Park could include a range of alternative fuel options to reduce use of petroleum fuels such as vehicles with engines modified to burn compressed propane, dual natural gas/gasoline, or biodiesel. Also, ITS components would help to monitor and manage traffic flow, and reduce congestion at the park's major visitor destinations. Roadside pull off, parking area, and traffic calming improvements would further contribute to overall energy savings and improved vehicle fuel efficiency to the extent they reduce vehicle queuing and unnecessary engine idling. This reduction in fuel consumption would be considered a long- term beneficial impact.

For these reasons energy and resource conservation has been dismissed as an impact topic in this document.

Prime and Unique Farmlands

The Farmland Protection Policy Act (7 USC 4201 et seq.) and the U.S. Department of the Interior (Environmental Statement Memorandum No. ESM94- 7) require an evaluation of impacts on prime or unique agricultural lands. Prime or unique farmland is defined as soil that particularly produces general crops such as common fruits, vegetables, and nuts. According to NRCS, none of the soils in the park are classified as prime or unique farmlands. Therefore, the topic of prime and unique farmlands is dismissed as an impact topic in this document.

Environmental Justice

Executive Order 12898, General Actions to Address Environmental Justice in Minority Populations and Low- Income Populations (Federal Register 1994), requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low- income populations and communities. The alternatives would not have disproportionately high and adverse effects on minorities or low- income populations or communities as defined in the U.S. Environmental Protection Agency (EPA)



Environmental Justice Guidance (EPA 1998). Therefore, environmental justice is dismissed as an impact topic in this document.

Air Quality

The 1963 Clean Air Act, as amended (42 *United States Code* (USC) 7401 et seq.), requires land managers to protect air quality. Section 118 of the Clean Air Act requires parks to meet all federal, state, and local pollution standards. *NPS 2001 Management Policies* address the need to analyze potential impacts to air quality during park planning. Under the Clean Air Act, Arches National Park is designated as a Class I area. Class I areas are afforded the greatest degree of air quality protection.

Construction activities necessary under either alternative would have short- term minor adverse impacts on air quality due to releases of pollutants from internal combustion engines and fugitive emissions. Sources would include continued emissions from visitor vehicles in the park, construction vehicle emissions, and construction-related impacts from the disturbance of soils. Dust abatement efforts would be implemented to control fugitive dust emissions during construction and impacts would be localized. In the long- term, project actions associated with the transportation implementation plan such as motorized interpretive tours, ITS, and pull off and parking facility improvements would reduce vehicle emissions to the extent that they reduce the number of private vehicles entering the park or that they reduce vehicle queuing and unnecessary engine idling. This would be considered a long- term, beneficial impact to air quality. Therefore, air quality was dismissed as an impact topic in this document.

Noise and Natural Soundscapes

In accordance with NPS 2001 Management Policies and Director's Order 47: Sound Preservation and Noise Management, an important part of the National Park Service mission is preservation of natural soundscapes associated with national park units. The natural soundscape is the aggregate of all the natural sounds that occur in the park (absent human-

caused sound), together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive, and can be transmitted through air, water, or solid materials. It includes all of the sounds of nature including such "non-quiet" sounds as birds calling and thunder. Some natural sounds are also part of the biological or other physical resource components of parks (e.g., animal communication and sounds produced by physical processes such as wind in trees or running water).

Construction activities necessary under either alternative would cause impacts to the natural soundscape. However, these impacts would be limited in scope, short- term, and negligible. In the long- term, noise from motor vehicles and visitors using the park would continue. However, the resulting adverse impacts would be minor.

Improvements proposed under Alternative B, the transportation implementation plan would be placed in or adjacent to areas that are already developed, where minor or short- term additions to background noise levels are not as noticeable. The proposal of recessed pavement markers (rumble strips) within the paved roadway as a traffic calming component would create additional noise in the park, but related noise would be localized and negligible and not generally discernable to visitors at nearby scenic overlooks. The proposed operation and maintenance facility in Moab to support motorized tours could have long- term beneficial impacts to noise levels and the natural soundscape inside the park by reducing the number and types of private vehicles entering the park. For these reasons, noise and natural soundscapes has been dismissed as an impact topic in this document.



Alternatives Development

Planning Process

A multi- year transportation planning process for Arches National Park began in the fall of 2002. This comprehensive planning process involved extensive analysis of existing conditions, data collection, visitor surveys, and consideration of various ideas, options, and strategies for resolving transportation- related problems at the park. The following steps were completed during the planning process.

1. Review of past planning efforts and existing information and conditions at the park through field visits (Fall 2002 through Spring 2003)
2. Initial workshops with park staff and regional stakeholders and the general public; environmental scoping (February 2003)
3. Ongoing information gathering and data collection including visitor/travel surveys conducted at the park (Spring and Summer of 2003)
4. Development of initial transportation ideas, options, and strategies; and additional workshop sessions with park staff and the general public (Fall 2003 through Summer 2004)
5. Development of transportation plan alternatives and additional fieldwork and analysis; environmental screening and analysis (Summer 2004 through Spring 2005) and newsletter reporting on project status (Fall 2004)
6. Draft Transportation Implementation Plan and Environmental Assessment development and review process (Spring 2005 through Winter 2005/2006)
7. Transportation Implementation Plan and Environmental Assessment published (Summer 2006)

8. Public meetings to obtain comments on Transportation Implementation Plan and Environmental Assessment (Summer 2006)

Overview of Public Involvement and Community Outreach Activities

Public involvement was an integral part of the development of potential transportation solutions. Project stakeholders, interested agencies, and the public- at- large were identified and notified at the beginning of the planning process and have been involved throughout the project. American Indian tribes were notified at the beginning of the project and were invited to participate in all public meetings. In addition to the National Park Service, key stakeholders involved in development of alternatives included the Bureau of Land Management (BLM), City of Moab, Grand County, and the Utah Department of Transportation (UDOT).

Two public workshop series were held during the project. In February 2003, the project team met with a diversity of stakeholders and community groups throughout the region to gather ideas and input that helped shape the range of transportation options to be considered. Workshop sessions were held during the day and general public meetings were held in the evenings. Another round of public meetings took place in November 2003, at which time the project team met with stakeholders and held an evening public meeting to present preliminary options, ideas, and strategies to the general public.

Participants in public workshop sessions offered a diversity of opinions and comments on a wide range of topics related to transportation within and surrounding Arches National Park. Participants were interested in making sure that plans at the park were coordinated with plans for the regional transportation system, including improvements to adjacent and nearby highways and the proposed expansion of the regional nonmotorized trail network. Participants also



were interested in a shuttle and/or motorized sightseeing/interpretive tour program within the park, as well as shuttle access to and from Moab. Existing tour providers wanted to ensure that new plans for a motorized sightseeing/interpretive tour would provide a different type of experience than their services offered, and as such would be targeted toward a different customer base. Overall, the public was interested in making some changes at Arches National Park that would improve the visitor experience, protect natural resources, and diversify the range of transportation options available to park visitors.

Various community involvement tools were implemented to outreach to the public during the planning process. Press releases, news articles, project information sheets, and a project newsletter have been distributed, published in newspapers, and posted on the park's website to keep the public informed.

A more detailed description of the stakeholder and public involvement process is provided in Chapter 5, Consultation and Coordination.

Planning Process Outcome: Transportation Implementation Plan

A transportation implementation plan was one of the primary outcomes of the multi-year transportation planning process. The transportation implementation plan (Alternative B in this document) focuses on actions that can be realistically and reasonably accomplished within the next six years.

Other actions and alternatives with longer implementation timeframes were considered but dismissed. After initially considering a broader range of long-term transportation options for Arches National Park, the NPS Washington Office of Alternative Transportation Planning Program Management requested that the park create a transportation implementation plan with scaled back alternatives that could be implemented within a six year timeframe. The scaled-back planning effort discontinued consideration of a park-based alternative transportation system (shuttle bus), a multi-purpose trail system, bicycle improvements, and long-term Intelligent

Transportation System (ITS) strategies that would have supported the park-based shuttle system. Given the reduced scale of alternatives, the National Park Service determined that the appropriate level of analysis for the implementation plan was an Environmental Assessment.

The change in the plan's focus to consideration of shorter-term options was primarily due to concerns related to funding constraints, as well as inconsistencies with the current Arches National Park General Management Plan published in 1989. A new General Management Plan would have had to be developed, and as such, the National Park Service was concerned that the broader range of actions would take more time for further analysis, planning and design prior to implementation (beyond the six year timeframe identified in the project statement of purpose and need). Longer term actions to address transportation issues would involve substantial changes that potentially could have appreciable effects on visitor experience and park resources, staffing, and operations. As such, the plan was scaled back to focus on actions that could be implemented in the near term to begin to address traffic congestion and related effects to natural and cultural resource effects. Refer to "Actions and Alternatives Considered but Dismissed" later in this chapter for more discussion.

The transportation implementation plan was developed through extensive coordination with local, state, and federal agencies and an interactive, multi-phased public involvement process. Potential elements to be included in the implementation plan were evaluated in accordance with the following criteria:

- Consistency – with regional and park goals and policies
- Mobility – the ability to accommodate visitor access to park features, balanced with the need to enhance visitor experience and protect resources
- Capital, Maintenance and Operating Costs – of the proposed elements and considering



affordability and cost effectiveness to users, providers, and taxpayers in general

- Visitor Experience – a qualitative determination of whether a proposal provides for a range of experiences and a high quality park experience to a diversity of visitors
- Safety and Security – addressing a diversity of visitor needs
- Resource Protection and Environmental Impacts – determination of whether proposed elements have any clearly irresolvable environmental impacts and analysis of appropriate measures for mitigating impacts
- Regional Land Use and Visitation– potential effects on land use patterns and visitation, tourism and socioeconomic patterns that affect the park and the region
- Public Support – a determination as to whether or not a proposal has obvious or overwhelming support or opposition within the visiting public it is intended to serve

Description of Alternatives

Two alternatives are presented in this chapter: the No Action Alternative, Alternative A, and the Transportation Implementation Plan, Alternative B, which is also the Preferred Alternative. The following elements are addressed under each alternative:

- Park Roads and Parking Areas
- Roadside Pull Off Areas
- Traffic Calming
- Motorized Interpretive Tours
- Intelligent Transportation Systems
- Ongoing Partnerships with Regional Interests
- Ongoing Visitor Experience and Resource Protection Monitoring
- Other Visitation and Congestion Management Strategies

In accordance with the National Environmental Policy Act, the alternatives and their effects are presented in a comparative format, along with a description of required mitigation measures. Rationale for the selection of the environmentally preferred alternative is also provided. A summary comparison of alternatives in tabular form is provided at the end of this chapter (Table 2.7), as well as a summary of environmental consequences (Table 2.8).

Alternative A: No Action Alternative

Under Alternative A, the park would continue managing existing transportation facilities in their current condition. Only minor physical improvements would be implemented over the course of the next six years, as already planned through the park's General Management Plan (GMP) and through normal, ongoing park maintenance and operations. Specific aspects of the park's ongoing transportation system and facilities under the No Action Alternative are described in more detail below.

Evaluation of the No Action Alternative is required under the National Environmental Policy Act (NEPA) and allows for analysis of the environmental consequences related to management of ongoing congestion at park features, parking areas, and along park roads and the related affects on visitor experience, resource protection, and park operations. Evaluation of the No Action Alternative provides a baseline against which to compare the proposed action alternative – implementation of the transportation plan (Alternative B) and related environmental consequences.

Park Roads and Parking Areas

The park's existing roadway system and parking areas would continue to operate as under current conditions, with minimal improvements over time on a case- by- case basis. For example, the shoulders of park roads would continue to be repaired and widened in some areas as part of annual maintenance projects. Minor improvements to roadway and parking areas, such



as the repaving, patching and sealing and the addition of signing, striping, or other treatments may also continue to occur as part of periodic maintenance.

No new parking areas would be constructed and no reconfiguration of parking would occur under Alternative A. Although the current GMP calls for the development of the Sand Dune Arch parking area, the park is proposing to construct the parking area in a different location and configuration than shown in the GMP. As such, a new conceptual plan for the Sand Dune Arch parking area has been created and is included as an element of the proposed transportation implementation plan, Alternative B.

Roadside Pull Off Areas

For years, motorists have been repeatedly pulling off at roadside edges throughout Arches National Park (referred to as “social” pull off activity), resulting in disturbance and damage to roadside soils, soil crust, and vegetation from tires and vehicles. More than 200 social pull offs have been created in the park, and more are added each year. In addition, when visitors get out of their cars at these locations, they tend to create social paths out into the landscape, causing further intrusion to sensitive soils and habitats and natural and cultural resources in the park.

Under Alternative A, removal and rehabilitation of existing social pull off areas likely would be limited to one or two locations annually, completed on a case- by- case basis as part of normal maintenance and operations activities. This activity would be contingent upon the ability to allocate budget and resources for the work in balance with other needs for maintenance and operations funds. No formalization or improvement of pull off areas would occur under Alternative A.

Arches National Park staff has continually worked to reduce the negative effects of motor vehicles at popular attractions and along traveled roadways in the park by limiting parking capacity at popular trailheads (such as Delicate Arch Trailhead/Wolfe Ranch) and increasing the level of patrols along the road to discourage social pull off activity and

speeding in the park. There is an ongoing concern related to the potential lack of maintenance and operations funds that may be available to support the future needs of park lands. To meet recommendations of a 2006 Core Operations review, staffing levels at Arches National Park will be reduced by 3 full time equivalents (FTEs) over the next five years. This will reduce the park’s ability to keep up with increasing ongoing maintenance and resource protection needs.

Traffic Calming

Traffic calming includes various physical treatments and management techniques aimed at reducing the speed of travel of vehicles without restricting access. Traffic calming measures can enhance safety for all travelers including motorists, bicyclists, and pedestrians.

Under Alternative A, current efforts related to traffic calming in the park would remain in effect. Current traffic calming efforts in the park are limited to the periodic installation of regulatory traffic signs directing travelers to use caution in certain areas, as well as patrols and ticketing of drivers traveling in excess of the posted speed limit.

Motorized Interpretive Tours

A motorized sightseeing/interpretive tour experience targeted toward the general park visitor within a moderate price range and operating at a regular frequency is currently not available at Arches National Park.

There are some commercial tours utilizing frontcountry roads at Arches National Park operated by a number of tour companies based in Moab and at other locations around the country. At this time, these tours are not authorized by the National Park Service via concession contracts or commercial use authorizations, and as such, they are not regulated by or coordinated through the National Park Service. This policy may change in the future with the requirement that frontcountry tour companies obtain either a concession contract or a commercial use authorization. A final decision will be based on a new Commercial



Services Management Plan to be developed at a future date.

Under the No Action Alternative, Alternative A, no new frontcountry commercial tour programs would be developed or operated by entities under the provisions of a concession contract or commercial use authorization. The current state of unregulated frontcountry commercial tours would continue. Continued operation of the few specialized tour programs currently regulated through concessions contracts (e.g., guided adventure tours utilizing backcountry “four-wheel drive” roads) would continue at least through the terms of the existing concession contracts. Upon the expiration of these concession contracts, continuation of these tours would be contingent upon the ongoing interests of the park and the companies that hold these concession contracts that authorize them to provide these tours.

Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) include the application of computers, communications, and sensor technology to multi-modal transportation systems and facilities. When integrated into the transportation system infrastructure, and in vehicles themselves, these technologies help to monitor and manage traffic flow, reduce congestion, provide alternate routes to travelers, enhance productivity, and save lives, time, and money.

Under Alternative A, No Action, existing Intelligent Transportation System (ITS) applications in the park and region would continue to operate as they do under current conditions. These include: self-guided audio tours, interactive informational kiosks, digital closed circuit television at the park entrance and visitor center, Internet-based reservation for the campground and information availability, automated fare collection, and highway advisory radio. No other additional ITS applications likely would occur under Alternative A, No Action, other than upgrades to current systems that might occur on a case-by-case basis depending on annual funding requests and budget allocations.

Ongoing Partnerships with Regional Interests

Arches National Park is committed to developing and strengthening long-term partnerships with regional interests, including other federal land managers such as the Bureau of Land Management, as well as the State of Utah, Grand County, City of Moab, regional tourism organizations, and other stakeholders. Currently, the park is working diligently to outreach to regional partners and interests on a regular basis. These partnerships and the policies, programs and projects that result from partnership efforts would continue under Alternative A, No Action.

Ongoing Visitor Experience and Resource Protection Monitoring

Visitor Experience and Resource Protection (VERP) monitoring has been funded and conducted annually at Arches National Park for several years. Ongoing VERP monitoring is an important and effective tool for measuring the potential effects of increased visitation on the quality of visitors' experiences and the health of natural resources.

The funding source for completing VERP monitoring annually is not guaranteed, and with continued budgetary limitations in the future, VERP monitoring may not continue. As such, it is not known if VERP monitoring would continue under the No Action Alternative since the availability of funding is not a given.

Other Visitation and Congestion Management Strategies

A number of approaches for managing visitation and congestion at features are being implemented on an ongoing basis at Arches National Park, consistent with the objectives and provisions of the park's General Management Plan and Visitor Experience and Resource Protection Implementation Plan. These approaches and activities include the regular dissemination of information to park visitors, provision of staff to assist visitors with on-site trip planning, ranger-



guided tours by reservation at the Fiery Furnace, and other forms of guidance and management provided routinely to park visitors. These current management and visitor support activities would continue to be offered under Alternative A, No Action.

Figure 2.1 on page 2- 7 depicts the existing system of roadways and locations of parking areas in the park, which would continue to operate as under current conditions with the No Action Alternative, Alternative A. Figure 2.1 also provides an existing map of Arches National Park showing areas referenced in the description of Alternatives A and B. Figure 2.2 on page 2- 8 illustrates a current typical roadway cross section at an existing social pull off location in the park.

Alternative B: Transportation Implementation Plan – Preferred Alternative

Introduction and Implementation Timeframe

The proposed actions described below collectively comprise the “action alternative” analyzed in this document. After an extensive planning and public involvement effort, it was determined that the purpose and need for action (described in Chapter 1) would be accomplished through the proposed actions of the transportation implementation plan, Alternative B.

The transportation implementation plan focuses on actions that can be realistically and reasonably accomplished within the next six years. This timeframe for implementation is contingent upon the availability of funding for staffing and resources that may be needed.

Park Roads and Parking Areas

This alternative would improve the function of the roadway system through implementation of roadside pull off and traffic calming improvements as described below. In addition, improvements are proposed at several parking

areas. Figure 2.3 on page 2- 13 illustrates the locations of proposed improvements in the transportation implementation plan, Alternative B.

In the past, Arches National Park has been able to improve conditions related to resource protection and visitor experience through “hardening” of existing parking areas throughout the park. The term “hardening” refers to improvements and delineation methods that contain parking areas to a maximum vehicle capacity, including curbing, striping, signing, fencing, placement of boulders, and other types of treatments. Implementation of hardening helps to ensure that park trails and features do not become overcrowded. Hardening also helps to ensure that parking areas can be more effectively managed to reduce negative effects to resources, in accordance with the park’s Visitor Experience and Resource Protection (VERP) plan goals.

Most all of the parking lots at Arches National Park have received hardening treatments and have been designed and developed according to the original intent of the 1989 General Management Plan (GMP) and the VERP Implementation Plan. However, there are still some areas at key attraction sites where visitors continue to park in spaces not delineated and striped for parking. This tends to create overcrowding on trails and degradation of natural resources. If too many people are on the trail system, the quality of the visitor experience is diminished and in some cases, people create social trails next to and near existing trails to travel around other visitors, or to get away from the crowded path.

In several locations (described below) parking would be slightly reconfigured and improvements added to help alleviate these problems and to improve overall operations, as well as visitor access and flow of travel. Proposed parking area improvements described below also would be needed to accommodate tour bus parking/staging at certain locations in the park. Implementation of these improvements would help to ensure that desired vehicle capacities are achieved.



Figure 2.1 – Alternative A – No Action

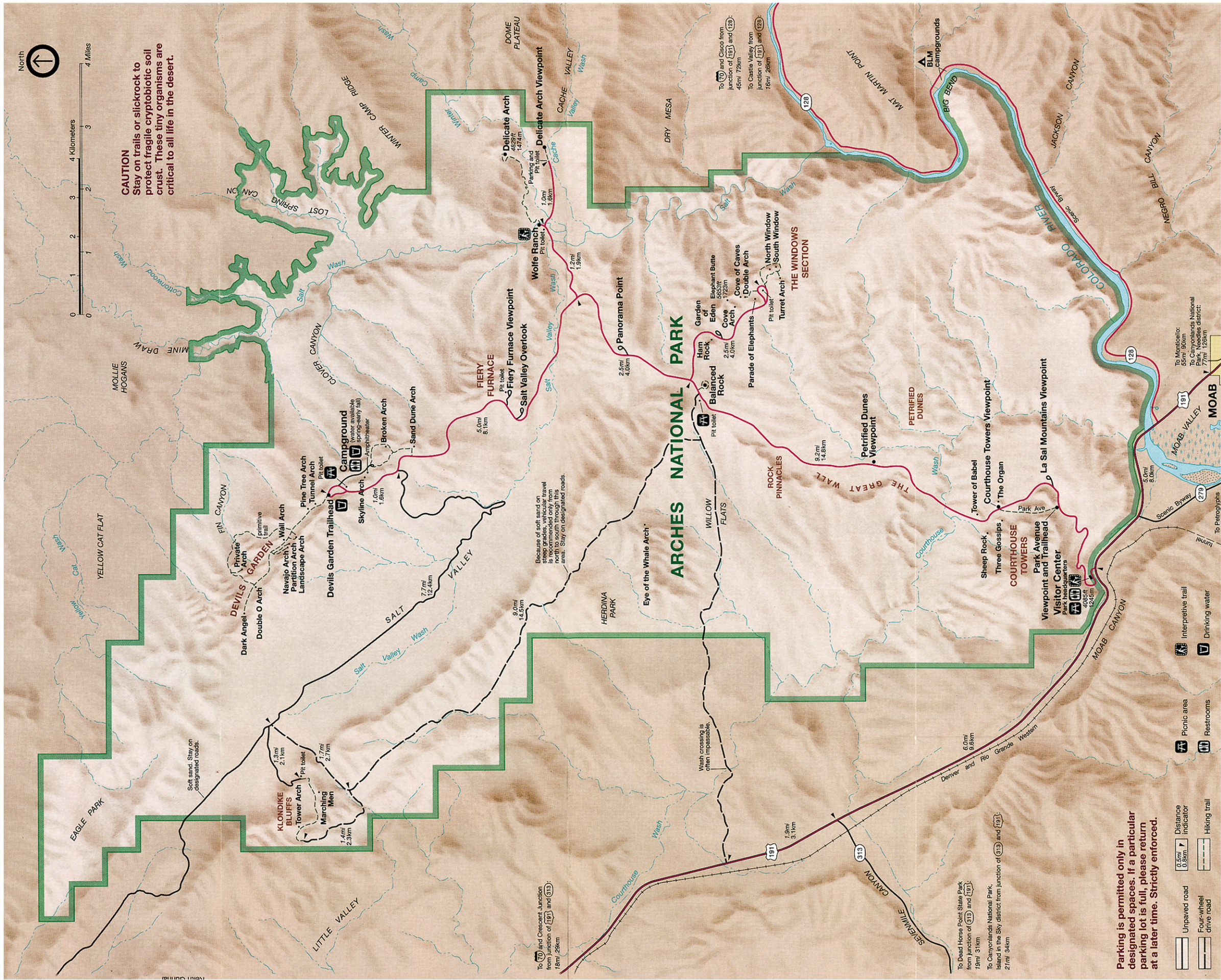
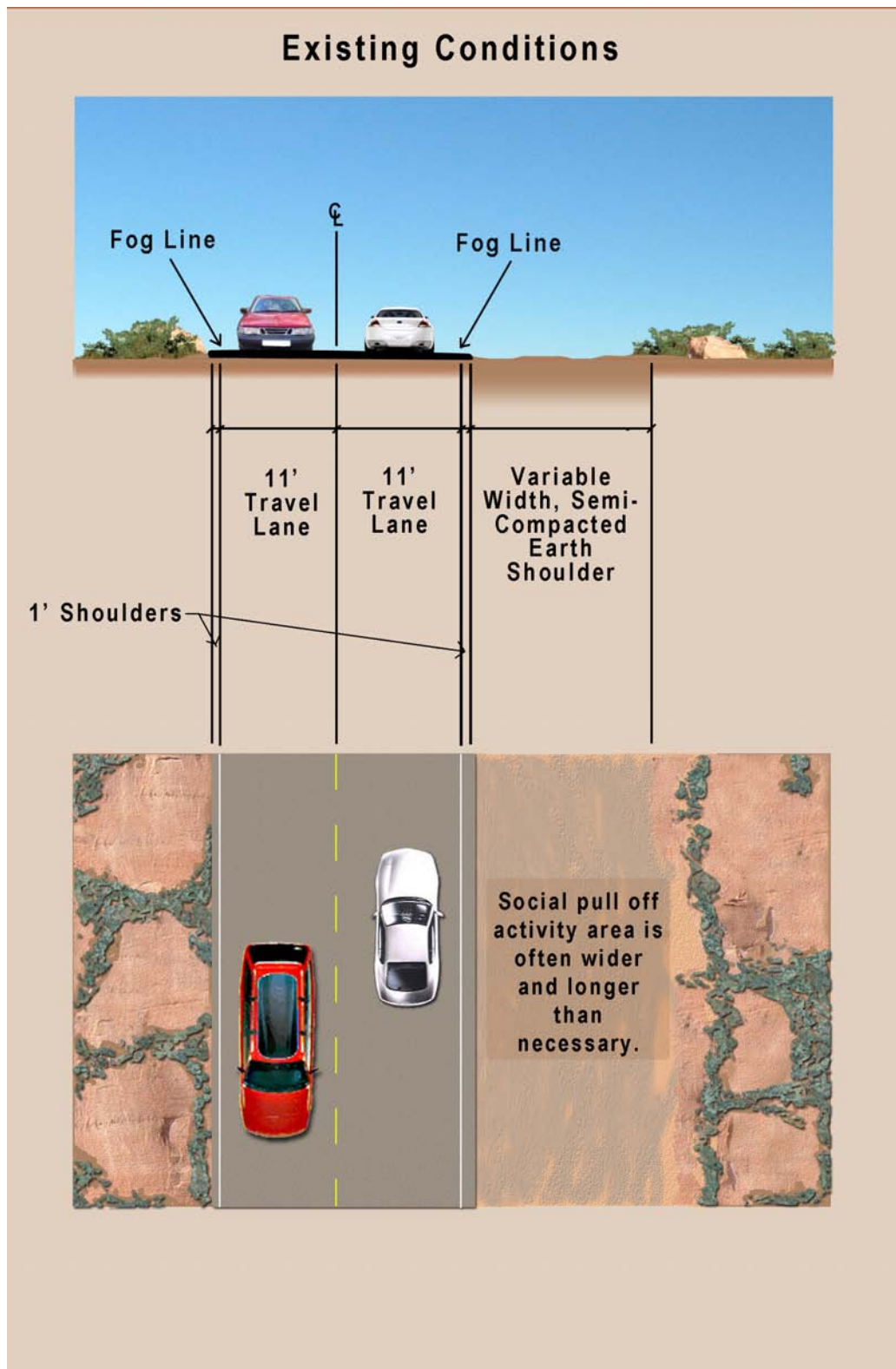


Figure 2.2 – Existing Roadway Section at “Social” Pull Off Location



Currently the parking capacity at trailheads tends to fluctuate because parking lots are not formally striped and some paved areas are wider than necessary for parallel parking. Visitors tend to park perpendicularly in parallel areas and overflow park off of paved surfaces and along road shoulders when parking areas get congested. Allocated parking capacities, established based on the park's GMP, VERP, and field evaluation provisions, are provided in Chapter 3, Affected Environment, under Transportation and Traffic.

During construction of parking area improvements, activities would be staged within the park with materials stored in existing developed areas, such as existing parking areas or in the park's internal storage and maintenance yard.

The Windows and Double Arch

The Windows and Double Arch parking areas would be redelineated. Redelineation would include restriping of parking spaces and travel areas and removal of some areas of excess paving. The objective would be to stripe and configure the parking areas so that the maximum available parking capacity is consistent with that prescribed in the Visitor Experience and Resource Protection (VERP) Implementation Plan. The Windows parking area would accommodate 35 vehicles. The Double Arch parking area would accommodate 24 vehicles. One reason for the redelineation and removal of excess paving is that visitors are parking in a front- in configuration in the parallel stalls because they are excessively wide. As such, the number of vehicles parked in this area frequently exceeds the designated capacity. Restriping on the Windows side would provide 27 front- in, angled parking spaces, as well as parallel parking spaces for either 4 larger- sized recreational vehicles (RVs) or 8 standard vehicles.

The 16 front- in, angled parking spaces on the Double Arch side of the parking area would remain as currently configured with no new delineation. On the opposite side of the angled parking, a parallel parking area would be delineated to accommodate either 4 RVs or 8 standard vehicles. Excess pavement would be removed from the parallel parking area to deter

vehicles from parking in front- in configurations. Also, excess pavement south of 16 angled parking spaces would be removed to discourage additional parking in that area and contain the total capacity to 24 vehicles at Double Arch.

Restriping of the Windows and Double Arch parking areas would not result in additional paved areas or surface disturbance. If parking areas are redelineated as proposed, there would be an opportunity to return approximately 2,150 square feet of currently paved area to natural landscape. This would involve removal of pavement and environmental rehabilitation of the area through protection, raking, contouring and other treatments.

The Windows is a designated location for a potential sightseeing/ interpretive motorized tour stop. A parallel parking/pull off area just southeast of the restroom trail entrance would become the designated pull off stop for tour vehicles. This area is located in close proximity to the Windows trailhead, just across the parking area.

Restriping plans for the Windows area also include striping pedestrian access aisles in front of the Windows trail entrance, as well as in front of the trail between the Windows and Double Arch on the south side of the parking area.

Refer to Figure 2.4 on page 2- 14 for a conceptual plan of the proposed improvements at the Windows and Double Arch parking areas. A detailed design plan would be prepared for this area prior to implementation of the proposed improvements.

Wolfe Ranch/Delicate Arch Trailhead

Hardening of the parking area at the Wolfe Ranch/Delicate Arch Trailhead has been completed and vehicle capacity is being maintained to the maximum level prescribed in the VERP Implementation Plan and 1989 GMP.

The Delicate Arch/Wolfe Ranch trailhead is a designated location for a potential sightseeing/ interpretive motorized tour stop (for the proposed program discussed later in this chapter). Because of the constrained area for parking and pull off, there is limited opportunity to create a



new, separate bus pull off/stop here. As such, a short-term tour bus drop-off/pick-up space would be delineated through striping and signing inside the existing paved surface of the parking area, in the travel lane and within walking distance of the trailhead. Tour buses using this drop-off/pick-up area would be expected to park (with engines turned off; not idling) in the nearby oversize vehicle lot or the Delicate Arch Viewpoint parking lot while the passengers are hiking. This provisional bus drop-off/pick-up area would accommodate use by motorized interpretive tours without requiring new pavement and improvements that would impact natural resources and add more costs for development.

Delicate Arch Viewpoint

The Delicate Arch Viewpoint parking area operates at less than full capacity most of the time. Space at the west end of the parking lot would be converted to a staging area for motorized tour vehicles that have dropped tour groups off at nearby sites elsewhere in the park (i.e. Wolfe Ranch/Delicate Arch Trailhead, Fiery Furnace, Devils Garden or other locations) while drivers wait for their passengers to finish their hiking/interpretive experience. (Refer to the discussion later in this chapter for information about proposed motorized interpretive tours.)

In most cases, the interpretive tour groups would stay with the tour vehicles during brief stops at sites within the park. However, this would not be the case under the day-long tour scenario (discussed later in this chapter), which would include hiking experiences at Delicate Arch, Devils Garden, and/or other areas. The Delicate Arch Viewpoint parking area is a suitable location for staging of tour vehicles because it is centrally located in the park; there is capacity available without the need for additional paving and improvements; and vehicles parked there would not create visual intrusions or detract from visitor experience.

A portion of the west end of the Delicate Arch Viewpoint parking area also has the space to be converted to a picnic area. Picnic tables would be added here and visitors would be encouraged to

use this site for picnic lunches. This would help to draw more visitors to the underutilized parking area and away from more congested picnicking areas of the park. This proposed action also would provide a place for picnicking for tour groups and/or tour vehicle drivers. Use of this picnic area likely would be limited to spring and fall, when biting insects are less prevalent in this vicinity.

These improvements would be implemented with minimal to no disturbance to the adjacent natural landscape. For example, picnic facilities would be incorporated at the existing edges of the parking lot (either on existing sidewalk surfaces or in parking lot islands).

Fiery Furnace

Park staff reports that overflow social parking at the Fiery Furnace is an ongoing problem affecting adjacent resources. Social pull off areas are proposed to be eliminated as discussed later in this chapter. Additional delineation within the existing developed parking area is proposed to formalize circulation and parking to protect resources from overflow and social parking and the potential creation of related social trails.

The Fiery Furnace has been identified as a potential sightseeing/interpretive motorized tour stop. As such, the parking area likely would need to be reconfigured to accommodate a tour stop, or similar to the approach at the Wolfe Ranch/Delicate Arch parking area, a tour bus drop-off/pick-up space could be delineated through striping and signing inside the existing paved surface, in the travel lane and within walking distance to the trailhead. Buses would then be expected to park in alternate location (potentially at the Delicate Arch oversize vehicle area or Delicate Arch Viewpoint parking lot until passengers are ready to be picked up again.

Sand Dune Arch

The park's 1989 GMP proposed that the Sand Dune Arch Trailhead parking area be expanded. The GMP included a conceptual plan of the proposed parking improvements. The redesigned and expanded trailhead parking area is needed to



adequately serve the Lost Spring Canyon area and would enhance visitor access to Sand Dune Arch and Broken Arch. A new parking area would be developed near the vicinity of the existing roadside parking area, but in a slightly different location and configuration than shown in the 1989 GMP). The parking area would include 15 front-in, perpendicular spaces and parallel spaces to accommodate either 4 RVs or 8 standard vehicles. Development in this newly proposed area would minimize the amount new disturbance, grading and earthwork necessary for construction.

The same parking lot configuration as developed at the Balanced Rock area would be constructed at the Sand Dune Arch trailhead. Existing inbound and outbound parking/pull off areas at Sand Dune would be removed once the new parking area is constructed. In these areas the pavement would be removed and the landscape would be environmentally rehabilitated to enable its return to a more natural condition, resulting in approximately 5,250 square feet of rehabilitation opportunity.

Construction of the new parking area would result in new disturbance to approximately 12,650 square feet of existing natural landscape surface area (soils and vegetation).

The new parking area would be designed to fit sensitively into the natural setting and landscape, minimizing potential disturbance to soils and vegetation and avoiding intrusions on surrounding rock features. The design would strive to balance cut and fill earthwork and to minimize the overall extent of earthwork to the greatest extent possible. Placement of the parking area in the flatter area north of the existing pull off and trailhead would enable earthwork to be minimized.

Refer to Figure 2.5 on page 2- 15 for a conceptual plan of the proposed improvements at Sand Dune Arch. A detailed design plan would be prepared for this area prior to implementation of the proposed improvements.

Skyline Arch Roadside Parking/Pull Off Area

The Skyline Arch roadside parking/pull off area would be improved as described later in this

chapter (refer to Table 2.3, Pull Off #16 on page 2- 22). Five additional outbound parking spaces would be constructed at this location by shifting the centerline of the main road to the east. Also, existing inbound parallel parking would be redelineated/ restriped to discourage front- in perpendicular parking (currently a problem at this location). Three- foot- wide pedestrian paths would be provided adjacent to the paved parallel parking area (in a compacted crushed rock surface). A crosswalk would be located between the inbound and outbound parking areas to enhance pedestrian safety. The feasibility of a slight shifting of the highway centerline to the east to accommodate more parking on the outbound side would need to be further evaluated in final design.

These improvements would result in additional disturbance of approximately 900 square feet of soils and vegetation at the roadside, but at the same time approximately 250 square feet of currently disturbed area would be rehabilitated to return to a more natural condition, resulting in a net increase of 650 square feet of newly disturbed area. (These calculations are depicted in Table 2.3, Pull Off #16.)

Refer to Figure 2.6 on page 2- 16 for a conceptual plan of proposed improvements at the Skyline Arch parking/pull off area. A detailed design plan would be prepared for this area prior to implementation of the proposed improvements.

Devils Garden

Several inbound and outbound wide spots and social pull off areas around the entrance to Devils Garden would be removed and treatments such as boulders, curbing, and/or fencing would be added to deter social roadside parking occurring in this area.

The designated parking capacity for Devils Garden is 150 stalls (including the Devils Garden picnic area). This number of parking spaces would be clearly delineated within the parking area and all other areas would be “hardened” and treated with curbing, boulders, fencing, and other elements so that the intended parking capacity can be maintained.



Signing would encourage RV drivers to continue to the end of the parking lot to parallel stalls, rather than to park in inbound pull off areas, taking up space that should be available for smaller vehicles. Excess pavement width at some of the parallel parking spaces would be removed to ensure that motorists are deterred from front-in parking, which creates more capacity than designated for this area.

Parking at the Devils Garden picnic area would remain as currently configured. Parallel parking areas to the northeast of the picnic area would be retained, but reduced in width to discourage front-in parking.

Redelineation of parking in the Devils Garden would not result in additional paved areas or surface disturbance. If parking improvements are implemented, there would be an opportunity to return approximately 6,200 square feet of currently paved area to natural landscape (pavement removed and area rehabilitated through protection, raking, contouring, and other treatments).

Refer Figure 2.7 on page 2- 17 for a conceptual plan of proposed improvements at Devils Garden. A detailed design plan would be prepared for this area prior to construction.

Table 2.1 on page 2- 18 depicts land area affects. Table 2.2 on page 2- 18 includes proposed parking capacities, at each of the parking locations proposed for improvements. Table 2.2 includes proposed parking if the parking lots are formally striped, enforced, and reconfigured. Proposed parking quantities are the same as the maximum parking capacities designated for these areas by the GMP, VERP, and more recent analysis. The table does not show existing capacities since the effective existing capacity is flexible depending on the number of vehicles that overflow and social park along the roadside and park in front-in configurations in spaces meant for parallel parking. As such, the existing parking capacity fluctuates on any given day in these areas of the park.



Figure 2.3 – Alternative B – Proposed Transportation Implementation Plan

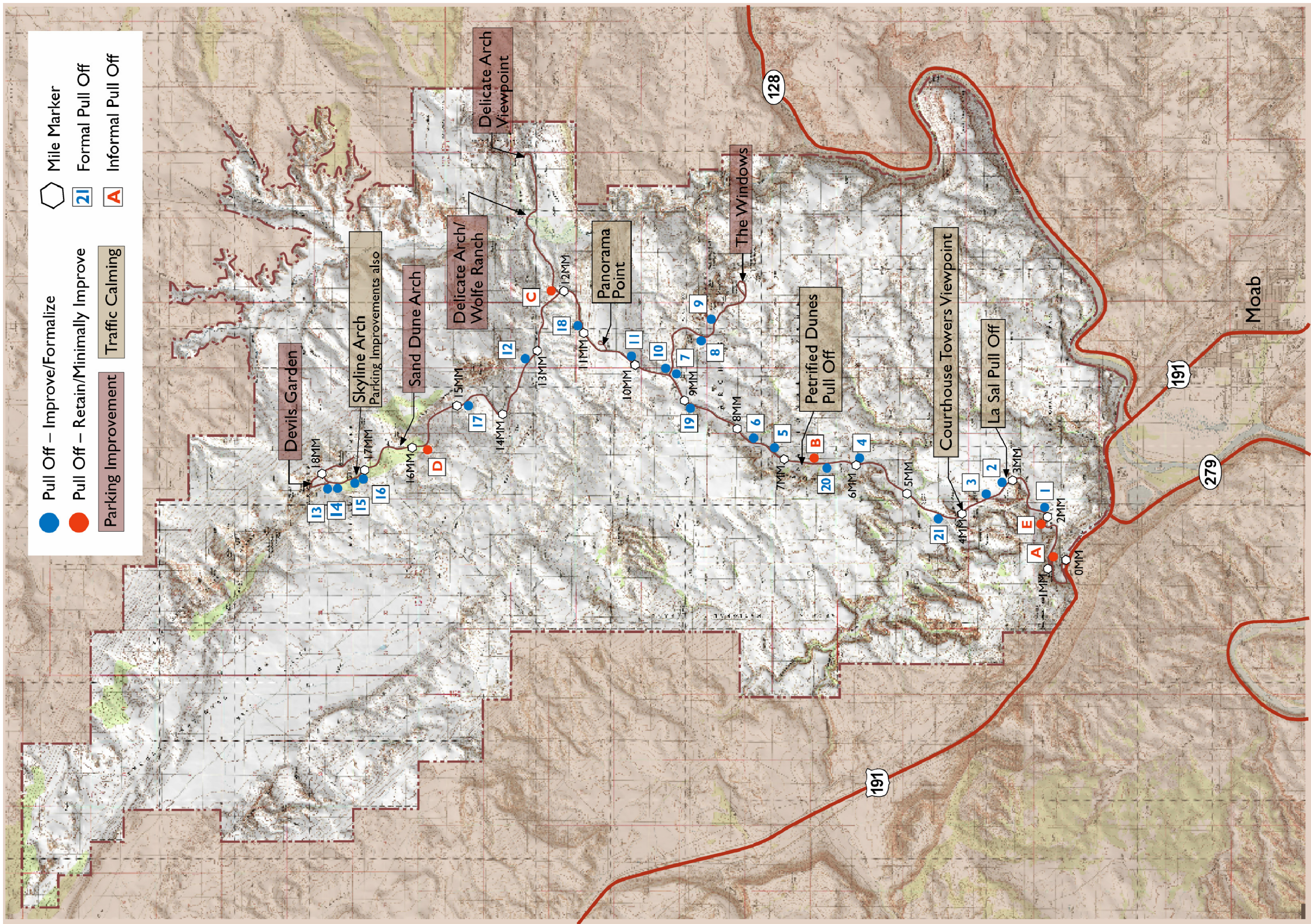


Figure 2.4- Proposed Improvements to the Devil's Garden Parking Area

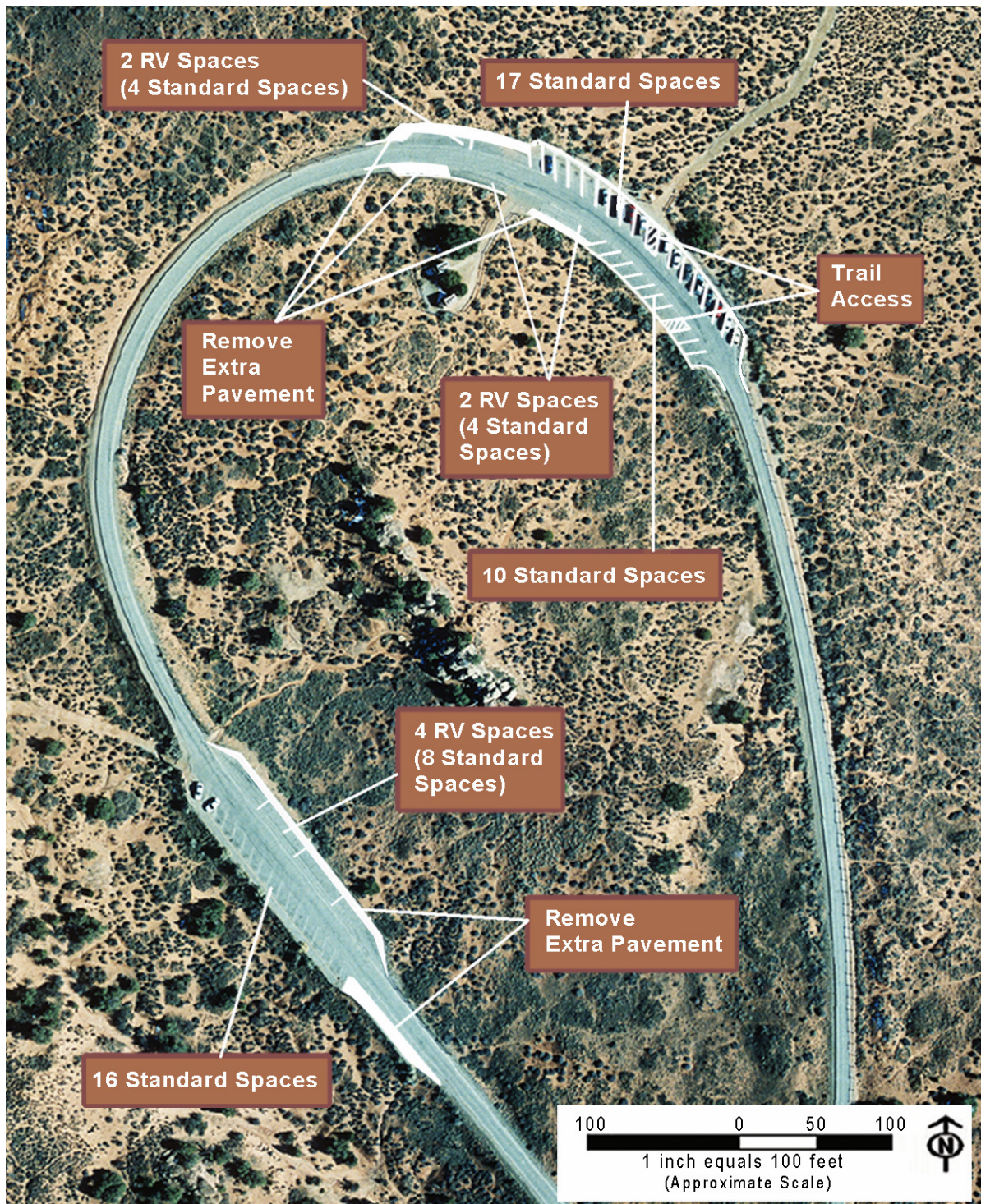


Figure 2.5– Proposed Improvements to the Sand Dune Arch Parking Area



Figure 2.6 – Proposed Improvements to the Skyline Arch Pull Off/Parking Area

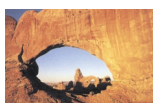
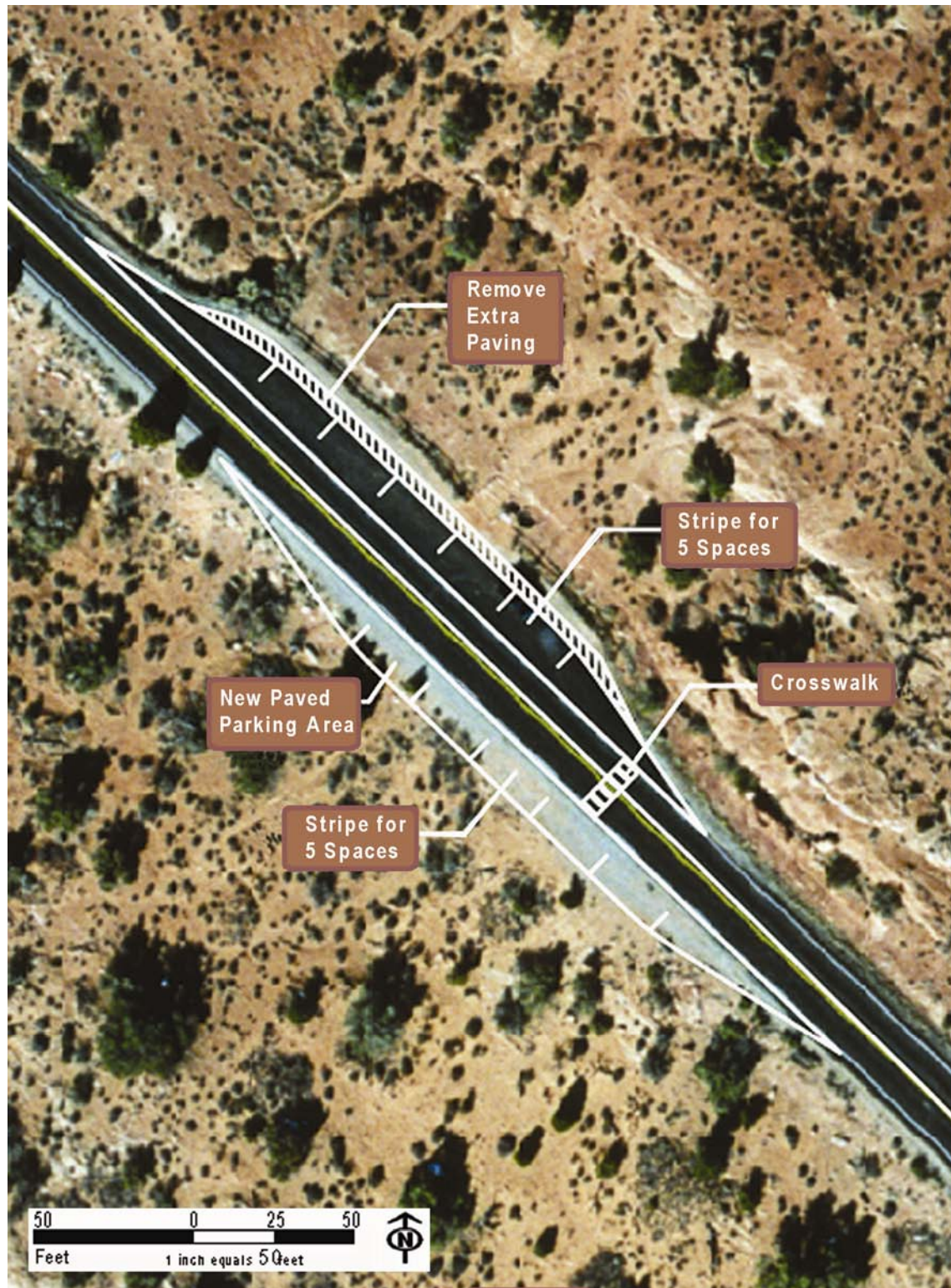


Figure 2.7 – Proposed Improvements to the Devils Garden Parking Area



Note: No new striping is proposed. White lines are shown to quantify parking capacity assumptions.



Table 2.1 – Calculations of Land Area Disturbance and Rehabilitation at Existing and New Parking Areas

Parking Areas	Proposed Sq. Footage for Rehabilitation	Proposed Sq. Footage of Additional Disturbance
The Windows/ Double Arch	2,150	0
Wolfe Ranch/ Delicate Arch Trailhead	0	0
Delicate Arch Viewpoint	0	0
Sand Dune Arch Trailhead	5,250	12,650
Devils Garden	6,200	0
Totals	13,600	12,650

Table 2.2 – Parking Area Capacities

Parking Areas	Parking Spaces:			Total Spaces
	Standard	Oversized*	Accessible	
The Windows	27	4 X 2		35
Double Arch	16	4 X 2		24
Wolfe Ranch/ Delicate Arch Trailhead	53	11 X 2	2	77
Delicate Arch Viewpoint	26	17 X 2	3	63
Devils Garden Picnic	14		1	15
Devils Garden	101	15 X 2	4	135

* Oversize spaces account for one RV or 2 vehicles. Maximum capacities of parking lots are sized with the assumption that the RV spaces may be occupied by two vehicles.

Roadside Pull Off Areas

Pull Offs to be Retained and Improved

The updated analysis of existing formal and social roadside pull off areas completed in 2004 for Arches National Park proposed that 26 pull offs be retained of the over 200 locations being used as social pull off areas in the park. Of these, 21 would be formally improved with paving, extruded concrete curbing, fencing and rocks placed at outside edges of pavement in some cases, and advanced signing.

The proposed vehicle capacity of each pull off to be formalized, as described in Table 2.3, was established based on original recommendations in the 2001 pull off study and later field review with park rangers as part of the 2004 updated study. Factors considered in establishing recommended pull off sizes included:

- the effective space currently being used as social pull- off space;
- physical limitations (slopes and topography) of the area and proximity of natural resources; and
- the need to minimize or maximize the pull off area to serve the related visitor use and/or to preserve and protect adjacent resources.

Pull off areas proposed to be formalized also would include a three- foot wide pedestrian area of compacted crushed rock adjacent to the outside edge of the extruded curb. This area would provide space for visitors to get out of their vehicles to enjoy scenic views and take photographs.

The other five pull off areas would be retained as unpaved, informal pull offs. These five informal pull off locations would remain in their current condition with minimal improvements (only minor regrading at some locations). The other



locations would be removed from use as social pull offs through treatments at the roadside and environmental rehabilitation. Also, because many of the areas disturbed by social pull off activities are much wider and longer than the area needed to accommodate the proposed pull off improvements, these existing disturbed areas adjacent to areas proposed for formal improvements would be environmentally rehabilitated.

Proposed roadside pull off locations throughout the park to be either formally improved and paved or to be retained as unpaved areas for informal use are depicted in Figure 2.3. The proposed roadway cross section at a formalized pull off area is shown in Figure 2.8 on page 2- 29 and typical pull off configurations are shown in Figure 2.9 on page 2- 30. A photo simulation of pull off improvements is shown in Figure 2.10 on page 2- 31. Additional aerial map graphics have been created for each of the pull off locations showing the proposed area of improvement and the potential area of new disturbance (including proposed pavement to formalize the pull off area, as well as a five- foot work zone around the pull off).

Table 2.3 includes descriptions of existing conditions and proposed improvements related to each of the 21 pull off locations proposed for improvement, beginning in the inbound/ northbound direction of the park road system. Table 2.4 on page 2- 28 provides descriptions of the 5 pull off locations to be retained for informal use.

Pull Offs to be Removed and Environmentally Rehabilitated

Under Alternative B, the proposed transportation implementation plan, it is proposed that over 170 of the existing social pull off areas in the park be removed and the following treatments implemented.

- Physical barriers, extruded concrete curbing, and in some cases, ditching, placement of large boulders, and fencing; treatments would vary per location depending on existing conditions

- Signing and pavement markings indicating “no parking” at selected location (to minimize visual intrusion, the addition of signing would be a last resort and signs would be minimal in size and quantity)
- Broadening of public awareness of the problems associated with social pull offs through campaigns in park newsletters, website postings, word- of- mouth (through rangers), and other methods as appropriate and feasible given the level of available resources and staffing
- Enhanced staff monitoring and patrolling during the rehabilitation period (contingent upon the allocation of additional funding for staff time; some monitoring would be handled through volunteer efforts if appropriate and available)

Areas disturbed by social parking and pull off activity would be environmentally rehabilitated through various treatments. National Park Service resource specialists would be engaged in the development of specific treatment and recovery methods on a case- by- case basis as social pull off areas are rehabilitated.

Revegetation would only be considered where appropriate based on park natural resource specialists’ recommendations. Probable methods of rehabilitation and treatment would include protection from further disturbance, as well as scarifying, raking, and contouring of compacted soils to aid the process of natural recovery. The length of time of recovery would vary depending on conditions, but in some cases, it could take several seasons of growth for soils and vegetation to return to more natural conditions in these areas.

Overall, factoring in the areas to be paved and formalized, as well as areas to be rehabilitated at the pull off locations proposed for improvement, there would be a net area of disturbance of approximately 1,875 square feet. 11,900 square feet of already disturbed area that would be improved for pull off use, offset by 10,025 square feet of already disturbed area that would be rehabilitated at these locations.



Calculations for each proposed pull off improvement location are shown in Table 2.3. In addition, approximately 191,664 square feet (or 4.4 acres) of disturbed area would be rehabilitated at the more than 170 existing social pull off locations throughout the park to be removed and treated, for a total net rehabilitation of 189,789 square feet.

It is anticipated that pull off improvements and rehabilitation efforts would be implemented within the next six years including areas to be improved as well as areas to be treated and rehabilitated. Implementation of this work would be contingent upon the availability of funding for construction work, as well as staff time to direct improvements and rehabilitation efforts and to monitor effectiveness through continued patrols during the rehabilitation period.

Focus Areas for Initial Rehabilitation and Ongoing Monitoring

The park's goal would be to implement full closure of all social pull off locations within the next six years. However, limitations on funding, staffing, and other resources could require this work to be accomplished over a longer timeframe. With this in mind, the park has identified the following focus areas for initial rehabilitation efforts. Efforts would be focused in these areas initially and then the park would move on to rehabilitate the other areas. Also since these areas currently receive the majority of social pull off activity in the park, they would be continually monitored to assess the effectiveness of the rehabilitation treatments and the need for additional treatments.

The Windows: All social pull offs around the Windows intersection would be closed and treated. This area is a high priority for treatment due to the level of social pull off activity that occurs here and the level of degradation that has resulted from this activity. The area would be monitored closely for continued social pull off activity. If initial treatment methods do not deter social pull off activity, additional treatments would be needed to control this activity, including possible fencing.

Milepost 16 and 17: Treatments would be implemented throughout the area between Mileposts 16 and 17 to remove existing social pull off locations and deter this ongoing activity.

Fiery Furnace: All social pull off areas concentrated around the Main Road/Fiery Furnace Road intersection would be removed and treated. This is an area that would be more aggressively patrolled and monitored by the park to prevent further pull offs from being created.

Advanced Signing

For safety and sight distance purposes, advanced signing is proposed at eleven of the pull off locations proposed for formal improvements and two of the locations where pull offs would be retained in an unpaved condition (see Table 2.1). Four additional signs are proposed for existing pull off areas (refer to the Traffic Calming discussion). One sign located in advance of each of these pull off locations is proposed. Signing would include words such as "Scenic Pull Off (or Viewpoint) Ahead" and/or the universal camera symbol sign. In accordance with the Manual on Uniform Traffic Control Devices (MUTCD) guidelines, advancing notice signs would be placed approximately 500 feet in advance of pull off areas along the roadway.

The placement and design of signing would be context sensitive and cohesive with the natural setting, as well as responsive to the scenic values of the Arches National Park experience. For example, backs of signs would be painted with a color that blends with the natural environment. Signs would be placed in locations that do not interfere with important views. The number of signs installed and the sizes of signs would be kept to the absolute minimum necessary, and sign clutter would be avoided. Prior to installation of additional signs at the park, a sign plan would be developed to provide an opportunity to confirm the number of signs needed and analyze appropriate locations for placement. The sign plan would be prepared as part of construction contract documents for pull off improvements. The sign plan would be reviewed and approved by National Park Service



staff, along with the other construction plans and documents.

Promoting Pull Off Activity in Designated Areas

Continuing to promote the use of specific pull off locations by identifying them in existing park maps, brochures, and on the website would help to encourage visitors to plan in advance where they intend to stop for viewpoints, trailheads, and photo opportunities. Promotional efforts could also help to encourage use of lesser-known and less congested pull offs and help to divert use away from pull offs that are used more intensively. This may include designating place names for some of the newly formalized pull offs, if determined appropriate on a case-by-case basis by park staff.

Monitoring

The park would continue to monitor all roadside areas in the park to identify new social pull off problems as they arise during the rehabilitation period. Areas across the road from formalized pull offs in particular would be

monitored regularly once improvements are made and during the period of rehabilitation. Motorists tend to stop when they see a pull off on the opposite side of the road, with the perception that the location is a good place to stop for various purposes. These areas may need treatment if areas are expanding or social pull offs are occurring in the future. Ultimately, it is anticipated that less monitoring and patrols would be needed than under current conditions once proposed improvements are implemented and rehabilitation efforts have taken effect.

Given that staffing and resources at the park are already limited, and it is anticipated that staffing may need to be further reduced in the future based on current federal budget trends, additional funding likely would be necessary for an effective pull off monitoring program. A variety of potential funding options may be available to support these proposed actions, including funding for increased staffing and resources. Refer to the discussion later in this section for more information.



Table 2.3 – Pull Offs to be Improved for Formal Use

Pull Off	Description	Newly Disturbed Area (SF)	Proposed Rehabilitation Area (SF)
1	This pull off location would be formalized to accommodate two to three vehicles. The existing width of disturbed area would be sufficient for the needed pull off space. This pull off area is located at the end of a horizontal curve on the outside. The estimated sight distance approaching this pull off is less than the guideline distance recommended by AASHTO. Therefore, advance signing (one sign labeled with “Scenic Pull off (or Viewpoint) Ahead” and/or the camera symbol) would be installed at the inbound approach to this location. This location provides a good view of La Sal Mountains.	0	300
2	This pull off location would be formalized to accommodate two to three vehicles. This pull off is located on the outside of a horizontal curve. However, the curve is flat enough to provide the required sight distance. Some regrading and minimal fill (approximately 25 cubic yards or less) would be required in the existing ditch to provide a level pull off area. This fill would be placed over the top of already disturbed and compacted soils (from previous social pull off activities). This location provides a good view of the La Sal Mountains and the Courthouse Towers area.	0	2,500
3	This pull off location would be formalized to accommodate two to three vehicles. This pull off is located on the outside of a flat curve with adequate sight distance. The existing surface, width, and length are adequate, and no new disturbance would occur. This location provides a good view of the Tower of Babel, Three Gossips, Sheep Rock, and other features.	0	200
4	This pull off location would be formalized to accommodate two to three vehicles. The pull off was created when the road washed out and motorists starting using it as a space for parking. This pull off is used for day hiking, canyoneering trips, and overnight backpacking into the Petrified Dunes area. The pull off is located on the inside of a horizontal curve. Existing width and length are more than adequate to accommodate the pull off area needed. Erosion protection and drainage treatments are proposed to prevent future wash outs. This location, at Milepost 6, provides a good view of the Petrified Dunes, La Sal Mountains and the Great Wall.	0	1,250



Pull Off	Description	Newly Disturbed Area (SF)	Proposed Rehabilitation Area (SF)
5	This pull off location would be formalized to accommodate two to three vehicles. The previous study proposed moving this pull off 400 feet to the south. However, sight distance and vegetation disturbance would worsen, so it is now proposed that the pull off remain in its current location. This location provides a good view of Bean Pot Arch, Petrified Dunes, the Great Wall and the La Sal Mountains.	1,000	0
6	This pull off location would be formalized to accommodate two to three vehicles. There is more than adequate width and length present. Sight distance is affected by vegetation at the south end of the pull off, and as such, minimal trimming of the vegetation and advanced signing (one sign in the inbound direction) are proposed. The previous study proposed moving this pull off 200 feet south, but this would create additional new disturbed area. As such, it is proposed that this pull off be retained in its current location. This location provides a good view of the Petrified Dunes, Great Wall and the La Sal Mountains.	0	350
7	This pull off location would be formalized to accommodate two to three vehicles. Ideally, pull off areas should be located a minimum of 100 feet from intersections. However, in this case, traffic is moving slowly as it approaches the intersection, and moving the pull off location would result in more disturbance to soils and vegetation. Also the existing social pull offs in these locations seem to be operating effectively with no reports of traffic incidents. As such, it is proposed that context sensitive traffic calming treatments (colored paving, pavement markings, rumble strips, rocks at the edges of the road, etc.) and advanced signing (one sign in advance of the pull off) be incorporated into the design of this pull off and the intersection area. Such treatments likely would help to minimize confusion and congestion occurring in the vicinity of the intersection.	300	0
8	This pull off location would be formalized to accommodate five to seven vehicles. The pull off is located on the outside of a curve, and sight distance is adequate. Some widening would be needed resulting in new disturbance to vegetation and soils. Minimal grading and import of fill (approximately 25 cubic yards or less) would be needed to provide a more level area for the pull off. This fill would be placed over the top of already disturbed and compacted soils. This location has a good view of Balanced Rock and the Windows section with the La Sal Mountains in the back- round. It is also a popular location for sunset photography.	1,150	0



Pull Off	Description	Newly Disturbed Area (SF)	Proposed Rehabilitation Area (SF)
9	This pull off location would be formalized to accommodate two to three vehicles. Sight distance does not appear to meet the recommended distance. Therefore, advance signing (one sign in the inbound direction) and traffic calming techniques are proposed. This pull off location may be an appropriate place for some interpretation. There is an opportunity to interpret/educate visitors about the adjacent geology (cross- bedding in geologic formations).	1,000	200
10	This pull off location would be formalized to accommodate two to three vehicles. Some minimal widening would be needed. It is proposed that this pull off be moved slightly to the east to better align with the pull off on the opposite side of the road. This also would shift traffic movements into and out of the pull off away from the intersection. This location is a decision- making point for motorists who stop for orientation and/or to read the park map. Ideally, pull off locations should be located a minimum of 100 feet from intersections. However, in this case, traffic is moving slowly as it approaches the intersection, and moving the pull off location would result in additional disturbance to soils and vegetation. Also the existing social pull offs in these locations seem to be operating effectively with no reports of traffic incidents. As such, it is proposed that context sensitive traffic calming treatments (colored paving, pavement markings, rumble strips, rocks at the edges of the road, etc.) and advanced signing (one sign in advance of the pull off) be incorporated into the design of this pull off and the intersection area. Such treatments likely would help to minimize confusion and congestion in the vicinity of the intersection.	200	600
11	This pull off location would be formalized to include space for two to three vehicles. This pull off is located on the inside of a flat curve. The existing width is adequate, but the pull off would need to be lengthened beyond its current extent. Sight distance is limited, therefore advanced signing (one sign in advance of the pull off) is proposed. This location provides a good view of Balanced Rock, the Windows section, Salt Valley and Klondike Bluffs. This is also a popular location for sunset photography.	600	200
12	This pull off location would be formalized to accommodate two to three vehicles. This pull off is located on the outside of a flat curve. Sight distance is adequate. The width and length would need to be slightly expanded. This location may be an appropriate place to interpret geology in the park and information about the factors that have contributed to creating the green color of surrounding formations and lower Fiery Furnace.	450	100



Pull Off	Description	Newly Disturbed Area (SF)	Proposed Rehabilitation Area (SF)
13	This pull off would be formalized to provide space for two to three vehicles. Although the existing width is adequate, this location would need to be lengthened (minimally). This pull off is located on the inside of curve at the terminus of the Devils Garden loop. Therefore, sight distance is limited and advance warning sign (one sign in advance of the pull off) would be needed. Traffic calming techniques would be appropriate due to the traffic congestion that frequently occurs here, and also because motorists tend to travel at faster speeds than appropriate in this area. This area is a decision- making point for motorists stopping for orientation and/or to read the park map.	500	375
14	This pull off location would be formalized to provide space for two to three vehicles. This pull off is located at the outside of the beginning of a curve. Sight distance is adequate. The length of this area appears to be adequate to accommodate a pull off of the proposed size, but some minimal widening would be needed. This is a location where fencing and/or placement of large boulders would help to manage pedestrian access and contain damage to the soils/landscape. This location offers a good view of Salt Valley and is a popular sunset area.	875	0
15	This pull off location would be formalized to accommodate two to three vehicles. Existing width and length are adequate. This pull off is located on the outside of a curve. Sight distance is limited, therefore advance warning signing (one sign in advance of the pull off) is proposed. This is another location where fencing and/or placement of large boulders would help to direct visitors stopping at this viewpoint and contain damage to the soils and landscape. There is a lot of opportunity in this area to focus and contain vehicular and pedestrian activity in this area and to treat existing already disturbed area to help facilitate recovery to a more natural condition.	225	1,500
16	This pull off location would be formalized to accommodate five to seven vehicles. Traffic calming and advance warning signing (one sign in advance of the pull off) would be needed due to the limited sight distance. Some minimal grading also would be needed to expand the pull off area. This area is mainly used for overflow parking at the Skyline Arch trailhead. It is also a popular sunset location with views of Salt Valley and Klondike Bluffs. This would also be an appropriate location for a crosswalk to the trailhead.	900	250



Pull Off	Description	Newly Disturbed Area (SF)	Proposed Rehabilitation Area (SF)
17	This pull off location would be formalized to accommodate two to three vehicles. The area would need to be widened and lengthened to meet pull off safety design guidelines. The space to expand is limited due to existing topography. Sight distance at this location is adequate. This location provides good views of Salt Valley, Klondike Bluffs, the Upper Fiery Furnace and Windows area. It is also a popular sunset photography point.	1,500	0
18	This pull off location would be formalized to accommodate two to three vehicles. The existing width is adequate, but this location would need to be lengthened. This pull off is located on the outside end of a curve. Sight distance is adequate. Some minimal grading may be needed, but likely would result in minimal vegetation disturbance. This location would provide another opportunity to treat a fairly large area of previously disturbed landscape. This location provides a good view of the Salt Valley, Klondike Bluffs and the Fiery Furnace. It is also a popular location for sunset photography.	100	1,200
19	This pull off location would be formalized to provide space for two to three vehicles. Some minimal grading would be needed. The width appears to be adequate. This pull off is located on the outside of a curve. Sight distance is limited, therefore advanced signing (one sign in advance of the pull off) is proposed.	800	500
20	This pull off location would be formalized to accommodate two to three vehicles. The existing pull off area is very small and would need to be widened and lengthened. Sight distance is adequate. This location provides a good view of the Petrified Dunes, La Sal Mountains and Great Wall.	1,100	500
21	This location would be formalized to accommodate two to three vehicles. The existing area, located on the inside of a curve, is small and would need to be widened and lengthened. Sight distance is limited. Therefore, advanced warning signing (one sign in advance of the pull off) is proposed. This location provides a good view of Sheep Rock, the Tower of Babel, Baby Arch and Courthouse Wash.	1,200	0
Total Area =		11,900	10,025
Net Disturbed Area =		1,875* Square Feet	

**In addition, approximately 191,664 square feet (or 4.4 acres) of disturbed areas would be rehabilitated at existing social pull off locations throughout the park to be removed and treated, for a total net rehabilitation of 189,789 square feet.*



Table 2.4 – Pull Off Areas to be Retained for Ongoing Informal Use

Pull Off	Description
A	This pull off location would be retained in its current condition with no additional improvements. This informal pull off is functioning adequately for its use, mainly for rescue training by park staff and for use by rock climbers.
B	This location would be kept in its current condition without creating additional disturbance. This pull off is mainly used for the collection of plant resources, an important cultural activity by American Indians. Park staff would monitor this location to confirm that it continues to function effectively for this purpose. The size of this pull off likely would not accommodate more than two vehicles. Also, sight distance is somewhat limited here. Although it is desirable to minimize attention called to this location, installation of one advance warning sign would be proposed.
C	This location would be retained in its current condition with no additional disturbance. The area outside of this informal pull off would be protected from further disturbance through placement of large boulders. This would help contain the pull off to its existing configuration and size.
D	This existing pull off location would be retained as is and monitored closely over the near term to confirm its need. Since sight distance is limited at this location, potential removal and treatment may be desirable. There is a possibility for increased disturbance to soils and vegetation if this area is kept as an informal pull off. The installation of guardrail, fencing, large boulders, and/or other more “heavy” containment treatments may be needed to discourage use.
E	This location would be maintained in its current informal condition, although some minimal grading would be needed to retain a level surface for optimum use. This area is used by rock climbers and for search and rescue training.



Figure 2.8 ... Proposed Roadway Section at Formalized Pull Off Location

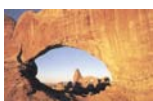
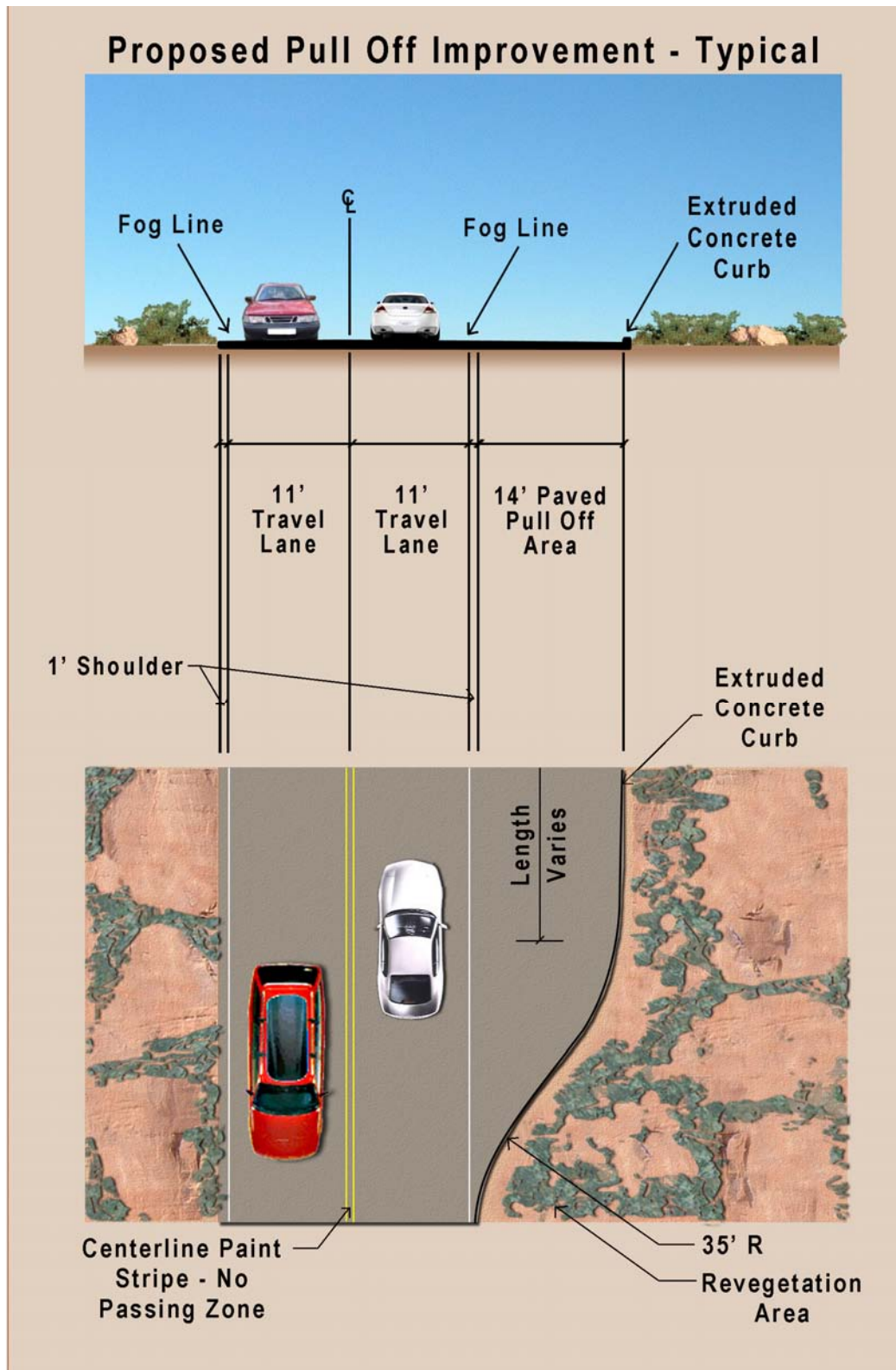


Figure 2.9 ... Typical Plan View of Improvements at Formalized Roadside Pull Off

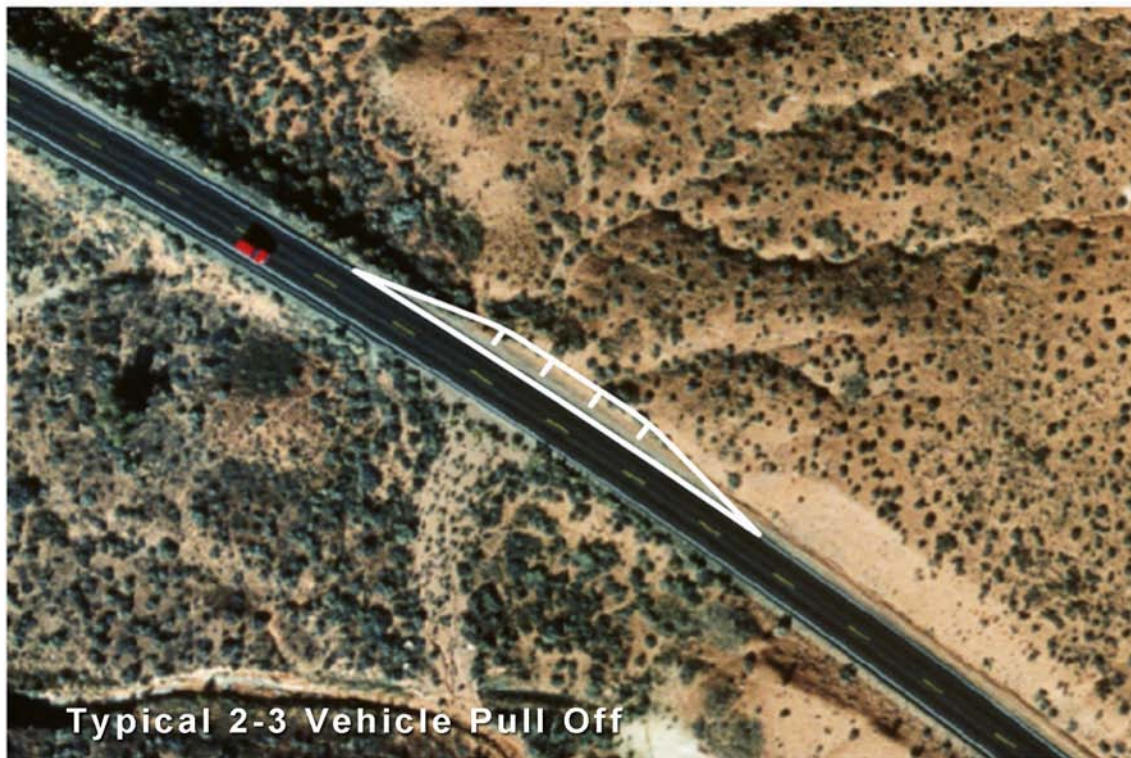


Figure 2.10 ... Pull Off Photo Simulation



Existing Condition



Traffic Calming

Traffic calming measures would be implemented through various strategies and physical improvements to reduce the traveled speed on roadways while maintaining vehicular capacity in Arches National Park. The most appropriate locations for physical improvements to implement traffic calming at the park are in advance of and at intersections, roadside pull offs, pedestrian crossings, and trailhead areas. Traffic calming applications would include elements such as recessed pavement texturing (rumble strips) and/or pavement markings in advance of areas. Changes in pavement coloring (different from the asphalt concrete surfaces of the park's existing roadways) in advance of these areas and at pedestrian crossings also would be an effective traffic calming tool.

Other possible treatments include signs directing drivers to "slow," crosswalk stripes, and other elements that would attract drivers' attention. Advance warning signs placed before pull off areas and pedestrian crossing areas are also effective for traffic calming. These treatments would be designed to be sensitive to the park context and placed to avoid intrusion on the scenic values of the park.

Traffic calming improvements are proposed for the following locations (listed from south to north), as described. Figure 2.3 depicts these locations. Detailed designs would be developed prior to construction.

La Sal

Advance signing is proposed to optimize use of this existing pull off area. One sign located in the inbound direction in advance of this pull off is proposed. More people likely would use this pull off rather than other social pull offs just to the north if advance signing is provided. The sign would indicate "Courthouse Towers Viewpoint" with a camera symbol – the universal symbol being used in national parks for a photo stop.

Courthouse Wash

Because motorists tend to travel at higher speeds through this area (including those headed downhill in the outbound direction) traffic calming treatments are proposed for the Courthouse Wash area. A combination of signs cautioning motorists to "slow" and context sensitive treatments to the pavement, such as texturing, rumble strips, and/or change in color at the Courthouse Wash area are suggested. Signs would be placed in advance of the area in both the inbound and outbound direction (one in each direction; two total).

Petrified Dunes

Advanced signing is proposed to alert drivers of the upcoming pull off, particularly since this is on a stretch of the road where drivers travel at higher speeds. One sign, located in the inbound direction approaching the pull off is proposed. Traffic calming treatments such as pavement texturing and/or a change in pavement color at the pull off area would also help to slow drivers upon their approach to the area.

Panorama Point

The existing sign located in advance of this pull off would be moved further back. Motorists do not have enough warning to provide adequate time to pull off in advance of this location. Moving the sign further back would prevent some social pull offs from occurring after this location, due to people passing by the pull off too quickly and turning around in that area.

Skyline Arch

In addition to the two advance warning signs proposed for this pull off (one inbound and one outbound, both located in advance of the pull off), traffic calming such as context sensitive pavement texturing, rumble strips, and/or changes in pavement color in this vicinity would help to slow traffic down in this area, where pedestrians are constantly crossing the main park road.



Motorized Interpretive Tours

Overview of Proposed Program

Motorized interpretive and sightseeing tours would encourage expanded visitor experiences and visitation to certain areas in the park while at the same time reducing congestion at some of the more crowded features. Tours would offer visitors another way to experience and travel through the park other than by private vehicle.

Arches National Park proposes to implement a motorized interpretive tour program that would be supported by the park, but operated by a private sector entity. It is envisioned that tour operations would be closely and cooperatively coordinated with the park. It is also envisioned that the tours would originate in and operate from a base in Moab, with intermediate stops between Moab and Arches such as Lions Park. The tour provider would be responsible for tour operations, vehicle maintenance, general marketing and advertising, and other activities. The park would provide support and partnership to the program in a number of ways, summarized later in this section.

It is envisioned that motorized interpretive tours would occur concurrently with general park visitation and park features would continue to remain open to the general public during tours (except Fiery Furnace where access is already limited to guided tours only). More information about managing tour group sizes is provided later in this section.

The Need for a Motorized Interpretive Tour Program

Currently, no general motorized sightseeing/interpretive tours on Arches National Park frontcountry roads are authorized by the National Park Service through the use of concession contracts or commercial use authorizations. Various types of commercial tours are offered by a number of companies that are not regulated or coordinated through the National Park Service at this time. Most of these tour services are tailored to specific clientele interested in a fully catered experience. The

majority of current tours that include a visit to Arches National Park are focused on guiding visitors to remote areas of the park. Most private tours in the region focus on providing access to Canyonlands National Park and river rafting on the Colorado River. The existing types of tour services offered are typically marketed in association with another type of activity, such as hiking, four-wheeling, and river rafting. The existing tours are tailored and marketed more towards “adventure seekers” and less toward the general population.

There is not a general motorized sightseeing/interpretive tour program focused on providing access to and interpretive information related to a variety of features within Arches National Park that operates on a regular basis (at least during peak visitation periods) or that offers tours at a moderate price range targeted toward and affordable by the general public. The park does provide guided interpretive tours of the Fiery Furnace; however, these tours are conducted on-foot (tour guides meet visitors at Fiery Furnace parking lot) from late March through October. Park staff and volunteers also provide one-hour interpretive walks each day at different locations throughout the park. Although these tours greatly enhance the visitor experience at Arches, a broader motorized interpretive tour program is proposed to provide an alternative to private vehicle access and travel through the park and to further enhance the visitor experience. The proposed tours would enable visitors to enjoy “car free” experience to, from and within the park. Many participants in public meetings were supportive of the idea of guided tours.

The proposed motorized interpretive tours would be provided at price packages marketable to a broad spectrum of the public, based on analysis of comparable tour experiences offered at other national parks and other non-Arches, Moab-based tour offerings. Discounted rates for students, children, seniors, and groups would be factored into the pricing structure.



Tour Management Structures and the Role of the NPS and Arches National Park

Motorized sightseeing/interpretive tours in the Arches National Park frontcountry would be implemented through a contractual agreement between the National Park Service and a private tour operator through the use of a concession contract. At this time, no such contractual agreement between the National Park Service and private tour operators exists for the provision of frontcountry motorized tours.

The National Park Service has issued a few concession contracts to private tour companies that provide guided tours on backcountry, four-wheel drive roads. Some travel on frontcountry roads is incidental to the conduct of those backcountry vehicle tours, but there are no specific concession contracts with tour providers focusing on frontcountry interpretive/sightseeing experiences at this time.

The best approach for the management structure of the motorized interpretive tour program at Arches would be determined as part of implementation if the NPS proceeds with initiating a motorized interpretive tour program. The NPS would evaluate options and come to a conclusion about the most appropriate and desirable type of permitting or contract method for motorized interpretive tours. The type of management structure implemented would also depend upon the availability of funding for the program to support involvement of Arches National Park staff and resources.

Depending on the selected permitting or contracting structure for motorized interpretive tours, it is anticipated that the NPS and Arches National Park staff and/or volunteers would be involved in the tour program in a number of ways as described below.

- Tour information would be made available at the park visitor center, Moab Information Center and/or other locations throughout Moab.
- Tour promotions, bookings, and fee collection would be handled as part of the operator's

contract. Park entrance fees would remain separate from the fees for the optional commercial tours.

- The park would provide designated parking areas at selected pull offs in the park, where the tour bus would stop to provide a brief interpretive overview and photography opportunities.
- Park staff would maintain control over the content and level of interpretation and possibly the provision of interpretive staff.
- The park would continue partnerships with the City of Moab, Grand County, and the Bureau of Land Management to identify tour stops that benefit regional visitors (e.g. Lion's Park bike path connector).
- Park staff would participate in decision-making related to tour origination points, routes, itineraries, durations, and scheduling.

After determining the specific parameters of the motorized interpretive tour program, Arches National Park would prepare a prospectus that outlines the requirements for operating the business. Interested businesses would then be able to apply by submitting written proposals that respond to established criteria. Primary factors for evaluating proposals include managerial competence, conformance to the terms of the prospectus and financial ability.

Motorized Interpretive Tour Vehicles and Facilities

Vehicle Options

National parks around the country are using various types of vehicles in a variety of settings to support a diversity of transportation and visitor needs and interests, everything from inter-city buses and touring coaches to old-style trolleys and other customized vehicles.

The type of vehicle chosen for tours of Arches National Park would include characteristics that encourage ridership, while also minimizing maintenance and operational costs.



Important desirable features of the potential tour vehicles in Arches National Park include the following.

- Character and size that fits the context – appropriate to the Arches National Park setting
- Good ride quality/orientation to visitor experience (air suspension springing, oversize shock absorbers, forward facing seats, large windows and good views to the outdoors, sightseeing roofs, etc.)
- Accessibility accommodations
- Ultra- low emissions, fuel efficiency, and high performance
- Alternative fuel options (as feasible and appropriate to the setting)
- Cargo carrying capabilities (ability to carry hiking, backpacking, cameras, and other equipment in a convenient manner)
- Air conditioning and/or, as feasible, open- air capabilities
- Good quality communications system
- Opportunities for interior interpretation (good audio and/or visual system)
- Vehicle capacity that could accommodate approximately 24 to 28 people, with the size and character of the selected vehicle being in scale with the context of the park and tour pull off areas

Visitor Supportive Services and Facilities Onboard

Since no new facilities such as drinking fountains, permanent shade structures, outdoor interpretive and information kiosks, or waiting platforms would be constructed in the near term inside the park, tour vehicles would need to be self sufficient in serving visitors' needs. The vehicles would need to be equipped with air conditioning to serve year- round visitors. Drinking water, interpretive and orientation information, and other services should be provided onboard. Tour operators would be

required to collect trash associated with drinking water (e.g. cups or plastic bottles) while onboard tour vehicles and would be required to dispose of the trash at a suitable, legal location outside the park. Tour vehicles likely would not need to include restrooms. Tour passengers would have opportunities to use restrooms at the visitor center and other locations (such as pick- up points in Moab, Devils Garden, etc.), so onboard restrooms would not be a necessity.

Fuel and Propulsion Options

The National Park Service is committed to the use of alternative fuels when feasible, due to environmental benefits associated with their cleaner burning characteristics and other factors.

The use of alternative fuels is expanding and alternative fuel technology is advancing all the time. About 30 percent of transit vehicles being built in the US use alternative fuel and propulsion systems, primarily compressed natural gas (CNG). The evaluation of fuel and propulsion technologies needs to consider the vehicle size and requirements, available resources, necessary power for the terrain traveled, performance, reliability, cost, and environmental conditions.

Preliminary research on availability of alternative fuels in the park region was completed during development of the transportation implementation plan. According to the US Department of Energy's Alternative Fuels Data Center, there are several alternative fueling stations for CNG, propane, biodiesel, and ethanol in Utah. Both CNG and propane would be readily available in the Moab area. Questar, a natural gas company, operates a natural gas compressor in Moab. Mountain States LP Gas has a large storage facility in Moab where a privately used propane tank could be placed on site.

Bio- diesel is becoming a more readily available fuel source, but more study would be needed to determine the feasibility of using this source for motorized interpretive tour vehicles at Arches National Park (given that manufacture of



necessary levels of the fuel would need to occur locally).

With the use electric and hybrid vehicles, there would be a need for special storage, maintenance, and disposal facilities related to electrical charging units and equipment. These facilities would be part of the tour operations and maintenance facility in the Moab vicinity outside the park, if the tour program is implemented.

Although alternative- fueled vehicles are typically more expensive than conventional internal combustion vehicles, grants and funding may be available to cover these costs due to the environmental benefits they provide. Overall, the strong environmental benefits that can be realized through the use of alternative fuels warrant the serious consideration of viable options for the area when selecting a specific vehicle type for use at Arches National Park.

For more description of the characteristics and benefits associated with various fuel and propulsion options, refer to the Motorized Interpretive Tour Feasibility Analysis.

Facilities to Support Motorized Interpretive Services

The motorized interpretive tours would need to be supported by a system of facilities and services, including facilities outside the park, based at a potential tour operations headquarters in Moab or other nearby location, as well as facilities inside the park. There is no developed space available for tour facilities inside the park, other than for tour bus drop-off/pick- up and staging in already paved areas. A strong benefit of establishing a partnership for motorized interpretive tours with another entity is that vehicles would be stored and maintained off- site at the tour operator's facility. Also, visitor facilities (such as ticketing) would be based in Moab under the responsibility of the tour operator.

Facilities and Services Outside the Park

It is envisioned that motorized interpretive tours maintenance and operations facilities would be

located at a Moab headquarters site associated with the private tour operator's business. Necessary maintenance and operations facilities to support a motorized tour service could include the following.

- Tour bus/vehicle storage area (could be indoor or outdoor)
- Tour bus/vehicle maintenance facility with washing station, equipment and parts storage area, and bus "barn" for repairs
- Management and operations offices and facilities (i.e. work spaces, dispatch facilities, drivers' lockers, lunch room, restrooms, etc.)
- Fueling station and fuel storage area
- Ticketing facilities (could be multiple sites and could include availability at visitor centers, hotels, and other sites tied together through Internet communications)
- Park- and- ride facilities (could be multiple sites and could include partnerships with local hotels, employers, etc. to use available parking areas in Moab as "park- and- ride"/ tour bus drop- off and pick- up locations)

Facilities and Services Inside the Park

Tour vehicles would be able to use existing pull off configurations and parking areas for tour passenger loading and unloading and no new facilities or paving areas would be constructed specifically for tour use. Proposed parking and pull off improvements are described previously in this chapter.

As such, facility needs inside Arches National Park would be limited to parking/staging areas (with time- limited spaces for visitor drop- off and pick- up) within *existing* paved parking areas at the following sites within the park, as well as designated pedestrian waiting areas within existing sidewalk and pathway spaces at these locations.

- Visitor Center
- Moab Fault Pull Off (existing interpretive sign – would be a quick stop/photo opportunity)



- Park Avenue Trailhead
- La Sal Viewpoint
- Courthouse Towers
- Petrified Dunes
- Balanced Rock
- The Windows/Double Arch
- Panorama Point
- Delicate Arch Viewpoint
- Fiery Furnace (brief photo stop only)
- Sand Dune Arch
- Devils Garden

At these locations, the tour stop would provide visitors with opportunities to get off the bus and visit the attraction, take a few photos, and then board the bus again to depart to the next location. Visitors would be expected to arrive and depart when the tour vehicle arrives and departs. Interpretive programs would be disseminated by the tour guide and/or by audio programs onboard and printed materials.

The use of the sites listed on this page for tour bus staging/parking during visitor drop- off and pick- up would depend on the tour itinerary option(s) in operation (see below and next page) and may vary throughout the year depending on seasonal demands and management decisions.

In order to accommodate tour vehicle pick- up and drop- off at these locations, some minor configurations of pavement striping and marking within existing parking and pull off areas may be needed. No new pavement or improvements outside areas already developed would be needed. Small, discreet signs or cues in the pavement would be provided to indicate the locations of tour vehicle boarding/deboarding areas to tour passengers. An added benefit of a specific staging/parking area at the visitor center and other locations in the park would be increased visibility of the tour buses and corresponding marketing benefits.

Options for Tour Scheduling, Routing, Frequency and Durations

Strategic Scheduling

Tours would be strategically scheduled to reduce traffic and parking congestion (and potential crowding at park attractions) in accordance with these objectives:

- Focus some tours around the off- peak hours to spread visitation through the entire day and reduce the peak demand for parking and access; and
- Focus some tours around peak visitation hours to reduce private vehicle congestion (visitors experience the park via the tour service, leaving their private vehicles in Moab).

As such, tours scheduled throughout the day, covering both peak and off- peak periods, would be the most effective means to reduce traffic and parking congestion, with a number of different touring options available to reach the broadest possible spectrum of visitors. Additionally, the financial feasibility of the tour program would depend on its broad availability. Tours would need to be convenient to use with multiple options for scheduling to appeal to the diverse needs and interests of park visitors. Flexibility and adaptability to visitor needs, balanced with reliability and consistency in tour scheduling would help to ensure a successful tour program.

The targeted audiences for tours and seasonal activities also could shape the itineraries developed for the tour program. Tour audiences may be interested in various experiences such as:

- Interpretive, informational, and educational;
- Scenic/sightseeing/photography (including sunrise and sunset groups); and/or
- Recreation/leisure hiking (timed to avoid the heat of the day in summer).

Providing variety in the tour timing, itineraries, and attractions visited would help to sustain participation and tour vehicle ridership over the long term. Multiple- time park visitors would have the ability to choose different tours and



experience the park differently each time they come.

Example Tour Itineraries

Example tour itineraries presented below are based on Arches National Park visitor interests and park staff's insights into visitation patterns and typical lengths of visits at various features.

Two- Hour Tour of Arches National Park

The two- hour park tour would actually be three hours roundtrip, originating at a pick- up location in Moab and ending at the same location in Moab for drop- off. Within a typical twelve hour day from approximately 7:00 am to 7:00 pm, four three- hour trips could be completed using the same vehicle (including time for boarding and deboarding of each group and driver breaks). In the winter, a typical day of tours would shorten, but could lengthen in the summer depending on demand. The two- hour park tour would include:

- Initial pick- up in Moab
- Start of park tour at Visitor Center – park orientation, opportunity to visit bookstore
- Drive to the Windows and Double Arch – brief stop / photo opportunities
- Drive to Delicate Arch viewpoint – short walk to the viewpoint
- The entire trip would be mostly driving/sightseeing from the tour vehicle and could involve additional quick stops at La Sal Viewpoint and Park Avenue depending on scheduling
- Possible stop at Visitor Center on the way back to Moab
- Drop- off in Moab

Half- day Tour of Arches National Park

The half- day park tour would actually be five hours roundtrip, originating at a pick- up location in Moab and ending at the same location in Moab for drop- off. Within a typical day, two five- hour trips could be completed using the same vehicle (including time for

boarding and deboarding of each group and driver breaks). The tour would include:

- Initial pick- up in Moab
- Start of park tour at Visitor Center – park orientation, opportunity to visit bookstore
- Balanced Rock – short hike of the trail
- Proceed to Windows for a short hike/ photo opportunity
- Picnic lunch at Devils Garden
- Full park drive; stop at a couple of scenic pull offs
- Delicate Arch Viewpoint – short walk to the viewpoint

Full- day Tour of Arches National Park

The full- day park tour would actually be seven hours roundtrip, originating at a pick- up location in Moab and ending at the same location in Moab for drop- off. Within a typical day, one trip could be completed using the same vehicle (including time for boarding and deboarding of each group). This “full day” tour would be geared more towards recreationists and hikers seeking a longer duration experience in a targeted area of the park, rather than sightseers looking for a general tour. The tour would include:

- All or portion of the half- day activities plus guided hikes to Fiery Furnace and/or Delicate Arch (or other locations) for total duration of six hours in the park

Proposed Pilot Program

Based on research of tours and shuttle programs implemented at other national parks and attractions, it is proposed that the motorized interpretive tour services at Arches National Park start with a pilot program. This program would initiate with a smaller initial number of vehicles in the fleet during the first one to two years of operation. Three tour vehicles would be procured for the initial pilot program. The pilot program would go through a period of testing of the itineraries proposed and other various



touring scenarios. The initial program could operate the three vehicles on the three different tour itineraries (2- hour, half day, full day) and monitor tour participation, visitor interests, and scheduling conditions. If one type of tour seems to be in higher demand, the tour provider could adjust the scheduling and pricing to provide more tours on that schedule.

Implementation of a pilot program would provide an opportunity to “test” the market and level of interest in interpretive/sightseeing tours at Arches, as well as to “fine tune” the capacity of the tours if needed during peak visitation periods to manage visitation within accepted VERP levels at park features. After a period of one year, the performance of the tour program would be measured against specific goals, objectives and criteria established at the beginning of the pilot program.

With the operation of 24 to 28 passenger vehicles, the pilot tour program would have the capacity to accommodate 168 to 196 people per day. This represents roughly 8 to 10 percent of the daily average visitation at the park, and would take approximately 70 to 80 cars per day off of park roads, assuming that tour passengers would otherwise be coming to the park in their private vehicles (at 2.4 people per car).

Formal Tour Program Operation

If the pilot program has been successful, additional vehicles could be procured, expanding the fleet and the number of tours offered. Market demand would help to determine the ultimate capacity of the tour program, but this demand would need to be balanced with the VERP goals for visitor capacity at features throughout the park. The initial expansion beyond the pilot program could involve doubling the numbers of tours provided and procuring an additional three tour vehicles plus a spare to serve the program, for a total fleet size of seven vehicles as the starting base of formal tour operations.

With multiple itineraries of tours operating at the same time in the park, the tour program managers would be able to vary tour routing so

that there would never be more than one tour vehicle at any given time in a pull off or parking area. Given the proposed capacity of the tour vehicles, the length of the park’s roadway system, and the proposed limitation of only one tour vehicle at one time in pull off and parking areas, it is not likely that the tours would contribute to overcrowding or congestion, particularly if tour sizes and visitation levels at sensitive park features are carefully managed during the peak visitation periods.

VERP monitoring during the pilot program and during ongoing formal tour operations would be an important tool in aiding management of visitation levels (including tour sizes, frequencies, and durations) at park features.

With the formal tour program operation, assuming 24 to 28 passenger vehicles, the program could accommodate 336 to 392 people per day under the initial base operation scenario (with the seven- vehicle fleet). This represents 16 to 20 percent of the daily average visitation at the park and would take approximately 140 to 160 cars per day off park roads.

Level of Public Interest/Market Demand

Based on analysis of existing tour services at Arches National Park and the results of travel surveys conducted in 2003, there appears to be a solid interest and therefore an unmet market demand for motorized interpretive tours. Particularly since comprehensive park tours geared toward the general population (and less toward adventure seekers and sports enthusiasts) are not currently being offered at Arches National Park, the demand for this new type of “car free” experience likely would be high.

The results of visitor surveys conducted in 2003 indicate there is public interest in guided bus tours at Arches National Park. Of the 52 percent of respondents who indicated an interest in shuttling services at the park, over 50 percent were interested in having guides and information on the shuttles. Of the 48 percent of the respondents not interested in shuttling services, 65 percent expressed that they would



be more interested in using a shuttling services if a guide was provided.

Many survey respondents specifically expressed an interest in tours and shuttling based on their positive experiences at other national parks in the region (particularly Zion National Park in southern Utah). Also, Arches National Park is frequented by higher proportions of international visitors, who are typically more familiar with and interested in touring and shuttling experiences. Given the survey results and information above, tour participation levels of 8 to 10 percent of overall park visitation during the pilot period and 16 to 20 percent of overall park visitation during formal tour operation do not seem unrealistic. Implementation of the proposed pilot program would provide the opportunity to test the market demand and visitor interest in tours, as well as these anticipated participation levels. Many participants in public meetings were supportive of the idea of guided tours.

Tour Pricing and Operational Cost Analysis

In a review of comparative touring experiences at other national parks, it appears that visitors are willing to pay a wide range of prices for interpretive tours commensurate with the length of the tour and the quality of the experience. Shorter duration tours (from one to two hours) typically range from around \$10.00 to \$20.00 or higher in average price per person. Longer half-day and full-day tours typically range from \$25.00 to \$50.00 or more per person. Tour prices vary depending on attractions visited, services provided, the availability of snacks or meals, and other factors.

This research on tour pricing at other national parks and attractions was conducted to determine potential pricing structure scenarios for the motorized interpretive tour program at Arches National Park. This analysis, coupled with the projected estimates of tour participation during the pilot program and later during formal operation, provides insight into a possible financial plan for the tour program as a sustainable private business venture.

The feasibility analysis completed for the tour program estimated potential operational and maintenance costs associated with a motorized tour service. Various operational scenarios were evaluated.

- Lowest- cost scenario: tour bus driver serves as interpretive guide (or audio program is used, or park provides volunteers or staff support for tours); minimal budget for marketing/promotions and visitor amenities onboard.
- Mid- range cost scenario: tour bus driver and separate interpretive guide provided by tour provider; mid- range budget for marketing/promotions and visitor amenities onboard.
- Higher cost scenario: tour bus driver and separate interpretive guide provided by tour provider; higher budget available for marketing/promotions, and amenities onboard (such as snacks, sack lunches, water, etc.)

The feasibility analysis also suggested potential strategies and incentives for sustaining tour participation over the long term and for discounts and package pricing. The analysis confirmed that a motorized interpretive tour program at Arches National Park has the potential to become an economically sustainable venture depending on pricing, tour schedules and itineraries offered.

Tour- Related Interpretive Services: Options for Arches National Park Involvement

If motorized interpretive tours are provided through a service or concession contract, Arches National Park would be able to partner with the tour providers to help shape the character and quality of the interpretive program conveyed to visitors aboard buses. Discussions with park staff have indicated a strong interest in ensuring that interpretation is accurate, encourages stewardship, and enhances the visitor experience. Involvement of Arches National Park staff in the development of a bus tour



interpretive program would be one way to ensure these goals are accomplished. Additional park operations funding would be needed to dedicate staff time to this effort. There are a number of ways park staff could assist with interpretive programs as part of motorized tours.

- Park staff could provide interpretive text for tour operators (if time can be budgeted and allocated for this effort).
- Park staff could provide interpretation training/education/auditing for private tour operators/guides and/or volunteer tour guides (if additional staffing is funded for such services).
- The park could provide automated audio/visual tour materials (or assist with development and direction of such materials) for use during park tours (if additional funding is provided for such services).
- Park staff could oversee development of printed materials and displays to be distributed to tour participants and displayed on buses and at tour stops (if additional staff time would be funded/allocated).

Another option would be for the NPS to provide staff and/or volunteers as tour guides and interpreters. One benefit of this strategy would be the opportunity to enhance visitor experience and resource protection through the level of and quality of interpretation provided. There may also be an opportunity to integrate VERP monitoring activities with the tour program (visitor surveys administered as part of interpretive tours). Contribution of these services (funded through the National Park Service) also would help to get the private tour program started and established, particularly if qualified personnel from the private sector are not readily available to guide the tours and provide interpretation. Additional funding for staffing and operations also would ensure ongoing monitoring of resource conditions at popular park features once the tour program is established.

Marketing and Promoting the Tour Program

Arches National Park staff would review materials developed by the tour operator. Park staff also would coordinate with regional partners and tourism organizations to develop appropriate messages to be reflected in the marketing, advertising and promotional materials developed by the commercial tour provider. A commitment to an effective marketing and advertising campaign would help to ensure the success of the tour program. A key area of emphasis of the campaign would be to encourage visitors to leave their vehicles in Moab and visit the park via the motorized interpretive tour options. This would decrease the amount of traffic on park roads and regional roads, and help increase economic activity in Moab.

Tour information would be integrated into Internet- based programs of the region, including tourism websites and the park's website. Multiple locations in Moab would become venues for tour booking, as well as for marketing and promoting the tours. Information displayed in the visitor center about congested conditions would provide an incentive for visitors to use the tour services. Lastly, designated parking for tour buses in visible and conveniently accessible locations at the visitor centers would provide direct marketing exposure for the tours.

Managing Tours in Consideration of Visitor Experience and Resource Protection (VERP) Implementation Plan Thresholds

For those attractions where visitation levels sometimes exceed thresholds prescribed in the park's Visitor Experience and Resource Protection (VERP) Implementation Plan, it would be desirable to monitor the affects of tours, and if necessary, limit the numbers of visitors arriving and departing these locations in tour groups. This would be of particular importance during times of peak visitation (seasonally and daily). Management of tour



group size would be handled in a number of ways. One of the simplest approaches would be to either discontinue tours in the sensitive locations (rerouting to other areas of the park) or to allow only tours and prohibit access by private vehicles during peak visitation periods when VERP thresholds are likely to be exceeded. Also tours could be timed to avoid periods of congestion and to spread out visitation at these features. The park would work with the tour operator to manage scheduling, frequency, and duration of tours and to make adjustments during peak visitation periods as needed to ensure that visitation levels at sensitive attractions are maintained within acceptable VERP thresholds.

Intelligent Transportation Systems

The proposed actions for ITS improvements in Arches National Park are focused on improving and utilizing regional and park systems already in place. Proposed actions that would be implemented within the next six years include the following.

- Integrate Arches visitor information with Utah's statewide 511 system.
- Enhance the existing Highway Advisory Radio (HAR) system.
- Enhance the utilization of Closed Circuit Television (CCTV) real-time footage of the entrance station for in-park monitoring, security, and traffic counting (by connecting CCTV cameras to the park network and adding vehicle counting software – computer upgrades and software additions would be added to the park's current system being used for security monitoring via CCTV, inside one of the existing park buildings). These improvements would preclude the need for inductor loops at the entrance station and would automate the vehicle counting process and provide counts in an effective electronic format for use in later transportation planning and analysis.
- Distribute the Arches ITS study to regional stakeholders.
- Enhance the use of the Arches National Park website information to broaden awareness about travel and parking conditions inside the park and to distribute visitation to off peak times and/or to less congested areas of the park.

In addition, as Internet communications of the National Park Service and region continue to evolve in the coming years, the availability of real-time information over the park's web-site would become an even more useful tool to visitors planning their trip to the park.

Additional real-time information indicating typical conditions at the park, orientation to parking areas and capacities could be posted on the website. Electronic kiosks potentially could be installed in Moab and at the visitor center at the park to help guide visitors and manage visitation levels at key features.

In the near term, information would be posted online based on staff knowledge of current park conditions. Over the long term, there may be an opportunity for loop sensors and remote video in parking areas throughout the park to provide immediate surveillance and reporting of parking conditions back to the system. Currently, the lack of available electrical power throughout the park and the difficulty in maintaining these types of systems with limited staff and resources present challenges that need to be studied further before implementation can occur.

Figure 2.11 on page 2-45 shows a conceptual illustration of an information kiosk that could be placed at the visitor center at the park or in Moab. In the near term this information kiosk could contain a static display of the parking areas and capacities at the park. Over the long-term it could be converted with electronic capabilities to display real-time parking conditions in the park.

Continuing Partnerships with Regional Interests

Continued partnerships between Arches National Park, other federal agencies such as the Bureau of Land Management (BLM), state agencies such as Utah Department of



Transportation (UDOT) and Utah State Parks, and local and regional interests such as the City of Moab and Grand County, would help to ensure ongoing effective management of tourism and visitation patterns and characteristics of the regional transportation system over the long term.

Partnerships with the BLM and state, regional, and local agencies would help to ensure that the visitation and congestion management strategies listed below can effectively be implemented.

Ongoing Visitor Experience and Resource Protection Monitoring

Monitoring of visitor experience and resource protection indicators and standards at key features within the park is an important tool for park staff in managing visitation and congestion at Arches National Park. The ability for park staff to determine if standards are being met can only occur through monitoring. Analysis of the results of annual monitoring assists park staff in making sound decisions related to future visitor use and transportation management strategies and actions.

As such, the transportation implementation plan proposes that VERP monitoring continue at Arches National Park. Ongoing monitoring would require continued annual operations funding for the park to support the program.

Other Visitation and Congestion Management Strategies

If park visitation continues to increase and individual features continue to experience overcrowding during peak visitation periods, various visitation management strategies would help to ease congestion.

The various strategies described below would not require physical improvements in the park, but would likely require additional staff time and operational resources to ensure effective program implementation. A variety of potential funding options may be available to support these proposed actions, including funding for increased staffing and resources. Refer to the

discussion later in this section for more information.

There is flexibility in how any or all of these strategies would be implemented. The park likely would try some different approaches on a trial basis to test their effectiveness before making more permanent changes.

Disperse Regional Visitation and Promote Off- Peak Visitation

This strategy would involve continued coordination between Arches National Park and partnering agencies (such as the BLM and state parks) to develop and implement strategies for dispersing visitation throughout the region. In addition, the park would continue to work with regional tourism interests in an effort to shift visitation from the peak season to shoulder seasons and improve year- round economic development opportunities for the region. The park would also explore opportunities to encourage visitation at different times of the day (dispersing visitation throughout the day, helping to relieve congestion during peak periods).

Promotional material and websites would advertise shoulder season tourism opportunities to help disperse visitation throughout the year. Additionally, visitors coming during the peak season would be encouraged to visit the park during off- peak times of the day, such as in the morning or early evening, and to visit other areas in the region during the middle of the day. Tourism promotional materials would continue to place an emphasis on the diversity of opportunities for visitors to the region, including mountain biking areas, hiking and camping opportunities on BLM lands, rafting trips down the Colorado River, and other activities.

Communication and Outreach Strategies/ Advanced Trip Planning

This strategy would focus on public information and education related to advanced trip planning. These communications would provide another opportunity to encourage visitors to enjoy the park during off- peak periods and to disperse



visitation throughout the region. If visitors are aware of the most congested times in the park in advance, they may choose to plan their trips differently. They may be willing to come to the park earlier or arrive at a later time. Advanced trip planning information would be available via the park website, at the Moab Information Center, at hotels, and other visitor centers around Utah. Visitors would also have access to information about park tours before coming to the park. If advanced information is provided, visitors may choose to experience Arches National Park via the motorized interpretive tour.

Key Feature Management

The park currently limits visitor access to Fiery Furnace through a permit system with daily limits on the total numbers of visitors, or the option of a limited number of ranger-guided tours. During peak visitation periods in future years, as visitation increases, it may be desirable to manage visitation to other key features through a similar approach. Implementation of this program would only be needed if conditions at particular features were failing to meet standards, and in this case, managed access likely would only be needed during peak visitation periods.

The Delicate Arch trail could potentially be a candidate for a permit system or “guided tours” program during peak visitation periods. A pilot program could be implemented for Delicate Arch during a season of high visitation to determine the effectiveness of this strategy. The purpose of this program would be to manage access and disperse visitation so that people could have a higher quality experience at Delicate Arch, but not to restrict access. If the program is effective, visitors would not be denied a trip to the arch. Rather, scheduling through the permit system or a guided tour may mean that they would need to visit at a specific time rather than spontaneously. If a permit or guided tour wasn’t available at their first choice of times, they would be encouraged to reschedule to another time of day or to another day during their length of stay in the area.

The motorized interpretive tour program also would provide some opportunities to manage visitation and crowding at key features. The various tours could be scheduled to create a sequencing of visitation that takes the pressure off the most highly visited areas (Windows, Delicate Arch, Devils Garden) during peak visitation periods.

Park information distributed to visitors also would encourage certain patterns of visitation. For example, visitors entering the park in the morning could receive a “suggested tour route” handout that explains how they could proceed through the park. Visitors arriving in the afternoon, could receive a different “suggested tour route.”

Expanded Visitor Recreation and Interpretation Opportunities

Expanding visitor recreation opportunities into areas of Arches National Park that experience less congestion would help to distribute visitors away from key features that tend to experience more intensive visitation. For example, picnic tables are proposed for the Delicate Arch Viewpoint parking area and Park Avenue parking lot to provide expanded picnicking opportunities and disperse that activity from other areas.

Additionally, because the existing Balanced Rock picnic facility is adequate in size and space, but not signed properly, it is proposed that additional signs showing the universal symbol for picnic facilities be located prior to the turn-off (one sign in inbound and one sign in outbound direction). These signs would be consolidated on existing posts identifying the pull off area. Signing would help to encourage more use of the Balanced Rock area.

Seasonal/temporary shade-providing elements at these locations would help to encourage more picnicking activity. The design and placement of these shade canopies would need to be fully sensitive to the surrounding visual context. Light-weight, low-profile, airy, tensile covered “lean-tos”, built to withstand the sun and heat could be erected during peak visitation times in



summer and then removed and stored during other seasons.

Additional interpretive signs would be placed at a few pull off areas to enhance the motorized tour experience. Refer to the roadside pull off discussion under Alternative B.

Visitor information materials would continue to be updated to promote new picnicking locations and interpretive opportunities. Information materials would also encourage visitors to try some of the lesser known recreational experiences and trails in the park, dispersing visitation away from the more popular features that experience congestion.

Estimated Costs of Implementing Alternative B and Potential Funding Sources

The estimated capital costs (to the National Park Service) of implementing the proposed action, Alternative B, are depicted in Table 2.5 on page 2- 49. Anticipated Arches National Park staffing needs to support implementation of Alternative B are shown in Table 2.6 on page 2- 50.

Various funding opportunities may be available to support the proposed transportation implementation plan actions. The NPS Transportation Management Program or Federal Lands Highways Program, Category III program may be direct funding sources for congestion management measures. FLHP Category I, NPS Fee Demonstration or Line Item Construction programs could potentially fund road and parking improvements. Other funding possibilities that could be explored for various parts of the recommendations include private or cooperating association fund raising, Federal Transit Authority section 5311 program, State Scenic Byway programs, or transportation improvements that are a component of a park commercial services contract.



Figure 2.11 ... Parking Information Kiosk Concept

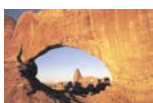


Table 2.5 – Estimated Costs of Implementing Alternative B

Proposed Element / Description	E Estimated Capital Cost Range		
Redelineation, pavement removal and rehabilitation improvements at Devils Garden (includes additional signing and edge treatments such as fencing, boulders, etc.)	\$ 95,000	to	\$125,000
New parking area development, trail connection and pavement removal and rehabilitation of old pull off areas at Sand Dune Arch	\$300,000	to	\$340,000
Signing/striping for a temporary tour bus stop at Delicate Arch Trailhead/Wolfe Ranch Parking Area	\$3,000	to	\$5,000
Add picnic tables to at west end of Delicate Arch Viewpoint Parking Area and Park Avenue Trailhead area	\$5,000	to	\$10,000
Redelineation, pavement removal, and rehabilitation improvements at the Windows/Double Arch (includes additional signing and edge treatments such as fencing, boulders, etc.)	\$65,000	to	\$90,000
Traffic calming improvements	\$75,000	to	\$150,000
Roadside pull off improvements – new pavement and curbing and rehabilitation of disturbed areas (includes development of sign plan, installation of signing, and edge treatments where necessary, such as boulders and fencing)	\$600,000	to	\$675,000
Rehabilitation of social pull off areas (approx. 175 locations)	\$1,150,000	to	\$1,260,000
Intelligent Transportation Systems	\$30,000	to	\$60,000
Other Congestion and Visitor Management Strategies	\$40,000	to	\$50,000
Total Estimated Capital Costs of Alternative B:	\$2,363,000.00	to	\$2,765,000.00

Note: Capital and operating costs associated with the proposed sightseeing/interpretive motorized tour program would be the responsibility of the private tour provider. One exception would be if the National Park Service provides funding for interpretive guides (as an optional element of the program). Estimated staffing needs and associated salary costs are depicted in Table 2.6 on the next page.



Table 2.6 – Estimated Staffing Needs to Support Implementation of Alternative B

Staffing Needs / Responsibilities	Estimated Salary Range		
1 Full Time Equivalent (FTE) park planner or capital project manager with expertise in transportation; could be a limited time position during implementation of transportation plan (GS 9 to GS 11)	\$66,200 (1)	to	\$72,000 (1)
1 to 1/2 FTE interpretive planner to assist with programming of motorized interpretive tour program; these duties would only be needed for a temporary period of time; then it is assumed existing interpretive staff could provide periodic support to motorized interpretive tour program as needed (to update interpretive information, monitor program effectiveness, etc.) (GS 9 to GS 11)	1 FTE: \$66,200 (1)	to	\$72,000 (1)
	1/2 FTE: \$34,000 (1/2)	to	\$36,000 (1/2)
4 FTE tour/interpretive guides during the pilot period and 7 FTE tour guides for full tour program implementation(GS 5 to GS 6) <i>Not: this is only one potential scenario under lowest cost operating scenario for the tour provider; under mid- range and highest cost operating scenario, park staff would not act as tour guides/interpreters so the cost would be 0; there is also the possibility that some or all of these positions could be filled by park volunteers or docents; there likely would be some seasonal fluctuations in demand for these services</i> () = number of positions	<i>Pilot:</i> \$180,000 (4)	to	\$220,000 (4)
	<i>Full Program:</i> \$315,000 (7)	to	\$385,000 (7)

Note: Estimated salary ranges for positions shown are approximated, based on 2006 salary information provided by the National Park Service.



Mitigation Measures for Alternative B

Proposed mitigation measures and best management practices are described below for Alternative B. These measures would be implemented to reduce potential effects on natural resources, cultural resources, visual resources, visitor use and experience, traffic and transportation, and other elements. In addition to the measures identified below, mitigation measures identified in the *Arches National Park General Management Plan/Development Concept Plan and Environmental Assessment* (USDI National Park Service 1989) are incorporated by reference and would continue to be implemented throughout the park.

General Measures during Construction

- Best management practices would be used for all phases of construction activity, including pre- construction, actual construction, and post- construction.
- A pre- construction meeting would be held to inform construction contractors about sensitive areas, including natural and cultural resource concerns of the park.
- Before construction begins, construction limits would be surveyed and staked and may be marked with construction fencing, tape, flagging, snow fencing, or some similar material, as necessary. The construction limits would identify and limit the area of construction activity. Protective fencing and barricades around construction sites would be provided for safety and to preserve natural and cultural resources adjacent to construction areas. The contractor would be responsible for ensuring that all work stays inside approved construction limits. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction limits. This does not exclude necessary temporary structures such as erosion control fencing.
- The project engineer would ensure that the project remains confined within the parameters established in the construction contract documents and that mitigation measures are properly implemented.
- Ground disturbance and site management would be carefully controlled to prevent undue damage to vegetation and soils and to minimize air, water, soil, and noise pollution.
- Equipment and material staging and storage, as well as vehicle turnarounds, would be confined to designated areas that would include existing disturbed areas along park roadways and within parking areas for construction activities inside the park. Construction related offices or laboratories would be located outside park boundaries.
- All demolition debris, including visible concrete and metal pieces, would be hauled from the park to an approved disposal location. All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work limits upon project completion. Any asphalt surfaces damaged due to work on the project would be repaired to original condition.
- Transportation Implementation Plan actions undertaken in Moab (if necessary) would comply with applicable regulations and policies including local grading and stormwater regulations, local policies and regulations governing the protection of natural resources, and local and state noise regulations.

Natural Resources

Conservation of Soils and Vegetation and Revegetation Measures:

- A soils treatment and revegetation plan would be developed to rehabilitate disturbed areas. Appropriate methods of rehabilitation and treatment of disturbed areas would be evaluated on a case- by- case basis and may



involve protection, raking, and contouring in some areas depending on park natural resource specialists' recommendations.

- Measures to mitigate the loss of biological soil crusts at the Sand Dune Arch Trailhead parking site would be identified and finalized during the detailed design phase. Measures may include (but would not be limited to) restoration of a partially- disturbed soil crust area in another part of the park to compensate for the on- site loss using crust “mined”(excavated and removed) from the development site.
- Ground surface treatment would include grading to natural contours, topsoil and topsoil mantle replacement, seeding, and planting. This work would occur as soon after the completion of construction as possible.
- In an effort to avoid introduction of non-native/noxious plant species, no imported hay bales or untreated straw would be used during construction. On a case- by- case basis, the following materials may be used for any erosion control dams that may be necessary: certified weed- free rice straw, cereal grain straw that has been fumigated to kill weed seed, wood excelsior bales, or rice straw or excelsior sediment control logs.
- Salvage topsoil mantle and topsoil separately, as well as incidental native vegetation (as feasible), from construction areas for reuse during rehabilitation of disturbed areas.
- Topsoil mantle (top 3”) would be removed from areas of construction and stored in stockpiles no more than three feet high at the outer portion of the construction limits. Then remainder of topsoil would be salvaged and stored in similar stockpiles. The sub- mantle topsoil would be respread to a minimum of 2 inches in as near the original location as possible and covered by a 2 inch minimum thick layer of the topsoil mantle supplemented with scarification, mulching, seeding, and/or planting with species native to the immediate area as deemed appropriate by National Park Service natural resources specialists. Any excavated fill would be reapplied thus restoring the soil disturbed construction and stockpiling. Construction areas would be returned to preconstruction conditions, stabilized, and planted with native species. Workers would be instructed to refrain from driving on, parking on, or compacting respread soil.
- Disturbance to existing native vegetation would primarily be contained in previously disturbed areas or within narrow construction limits. Whenever practicable, soils and plants affected by construction would be salvaged for reuse in site restoration.
- Revegetation, when implemented, would use salvaged plants and/or seeds or propagules from native species (genetic stocks originating in the project area) to the maximum extent feasible. Any revegetation plantings would strive to reconstruct the natural spacing, abundance, and diversity of native plant species.
- Undesirable plant species would be monitored and controlled, as necessary. To prevent the introduction of, and minimize the spread of non- native vegetation and noxious weeds, the following measures would be implemented during construction.
 - *Minimize soil disturbance.*
 - *Pressure wash and/or steam clean all construction and seeding/mulching equipment before entering the park to ensure that all equipment, machinery, rocks, gravel, or other materials are cleaned and weed- free before entering the park.*
 - *Pressure wash hauling vehicles before entering the park for the first time; subsequent entries would not require pressure washing unless the vehicle shows signs of mud, plant material, or other substances that could be considered harmful.*
 - *Cover all haul trucks bringing construction materials from outside the park to prevent seed transport.*



- *Where possible, limit vehicle and equipment parking to within construction limits, existing roadways, parking lots, or the access routes.*
- *Obtain all fill, rock, or additional topsoil from the project area, if possible. If not possible, then obtain weed-free fill, rock, or additional topsoil from approved sources outside the park. Some material may not be required to be weed free, such as asphalt pavement and roadway aggregate used to formalize pull offs and parking areas. The weed-free condition of the material from sources outside the park would be approved by the park resource management staff. If material from an outside source is not weed free, then the park may either reject use of material from that source or approve use if appropriate measures are taken to treat the material.*
- *Initiate rehabilitation of a disturbed area within 14 days of the last disturbance of the area when possible, with the exception of areas that would be disturbed again in 21 days.*

Water Quality, Stormwater Management, and Erosion Control:

- Best management practices for storm water management and sediment control measures in desert areas that apply specifically to the construction sites would be implemented, and appropriate erosion and sediment control measures would be in place at all times. An erosion and sedimentation control plan would be required as part of the construction contract documents associated with parking and pull off area improvement projects. The purpose of the plan and its recommended best practices would be to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation due to construction activities.
- Reconfigured and new parking facilities would be designed to minimize long-term effects on water quality through the use of best

management practices for runoff control. Possible best management practices such as the use of curbing to control and direct stormwater to detention facilities, the use of filter strips for water quality control would be implemented.

- Although selection and implementation of the preferred alternative would require soil recontouring and pavement removal and replacement, silt screens or other methods of erosion and sedimentation control, including best management practices, would diminish any impact to water quality. In desert areas, installation of silt fencing that rests on the desert surface and is secured by stakes, weights, or boulders, may cause less damage than actually disturbing the soil surface to install/bury the fence.
- Sediment traps would be inspected weekly or immediately following rain and silt would be removed when the traps are 75 percent full.
- During periods of heavy rainfall, the NPS field supervisor could issue a temporary stop order and work would be halted. During these work stoppage periods, project personnel would continue to check the silt fences and check dams, maintain the silt fences in effective condition, and remove accumulated sediment, as necessary, to ensure stabilization is maintained.

Wildlife:

- Construction and staging areas would be fenced to prevent access by wildlife, and to help prevent wildlife from consuming possible equipment fluid leaks such as antifreeze.
- Contractor would be required to maintain strict garbage control to prevent scavengers from being attracted to the project area. No food scraps would be discarded or fed to wildlife.

Special Status Species:

- Before construction, the NPS would conduct additional surveys for rare and special status species before taking any action that might



cause harm. In consultation with the USFWS and the state of Utah, the NPS would take measures to protect any sensitive species, whether they were identified through surveys or presumed to be present. Construction would be scheduled during the calendar year to avoid impacting special status species

Monitoring after Construction:

- Reclaimed areas would be monitored annually after construction (for a time period to be determined by NPS natural resource specialists) to determine if reclamation and revegetation efforts are successful or if additional remedial actions are necessary. Monitoring should identify and take steps to control noxious weeds or non- native vegetation. Monitoring techniques currently in use by NPS resource staff at Arches (including evaluation of aerial photo changes annually and in- the- field visual inspection) would be implemented in these areas. Remedial actions could include installation of erosion control structures, reseeding, and/or replanting the area, and other measures for controlling non- native plant species in accordance with NPS- 13 *Integrated Pest Management Guidelines*.

Cultural Resources

- In the event that archaeological resources are discovered during construction, the National Park Service archaeologist responsible for monitoring during construction would immediately notify the NPS field supervisor, who would halt work or redirect it to another area of the project until the finds can be documented, their significance assessed, and appropriate mitigation strategies developed in consultation with the Utah State Historic Preservation Officer. In the unlikely event that human remains or cultural items subject to the Native American Graves Protection and Repatriation Act (NAGPRA) are discovered, work would be stopped in the area of the find, and the appropriate provisions of NAGPRA implementing regulations (43 CFR Part 10) would be followed.

- Pre- construction surveys for archaeological resources and onsite monitoring of all subsurface excavation would be undertaken if necessary at construction sites located in Moab.
- If, through further tribal consultation, the Ute or other consulted tribes subsequently identify the presence of ethnographic resources, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.

Paleontological Resources:

- If unknown paleontological resources are discovered during construction, work in that location would be stopped until the resources could be properly recorded and evaluated. Measures would be taken to avoid further resource impacts or to mitigate their loss or disturbance

Visual Resources

- To minimize intrusions on visual resources, final design and placement of all new construction would be sensitive to the context of the desert landscape and compatible with the scenic characteristics of the Arches National Park experience.
- A signing plan would be developed as part of the construction contract documents. The contractor would provide the plan to the park superintendent for review and approval prior to implementation. The plan would address appropriate placement and design of new signs, including proper locations for traffic safety and preferred design treatments for visual compatibility and cohesion. The signing plan would address proposed new wayfinding/orientation, interpretive, and regulatory signs.



- Fencing and other edge treatments (lines of boulders) would be designed and constructed to be compatible with the desert landscape and consistent with other types of fencing and edge treatments already in place at the park (such as the post and rail fencing common at trailheads).

Visitor Use, Experience and Recreation

- To the extent practical, work would be scheduled to avoid construction activity and construction related delays during peak visitation times. No holiday or night time work would be allowed. Weekend work (Friday through Sunday) would not be allowed unless authorized in writing by the park superintendent.
- A public information program to warn of temporary closures, delays, and road hazards during construction would be implemented. This program would help convey appropriate messages to the public and aid in mitigating potential impacts on visitors' expectations and experiences.
- Announcement through public release to radio stations, press, publications, other public information outlets, and web sites, as appropriate, would be utilized as needed. The contractor would also provide daily delay schedules, variable message boards, coordinated with the project engineer, and temporary construction signs in and outside the park.
- Temporary short- term full closure of parking areas may be necessary on limited occasions. Such full closures would be for the minimal time required to complete the work activity or correct the problem.
- The contractor would provide a weekly delay schedule with daily updates to the NPS field supervisor to assist the park in management of visitation and park operations during construction.

- After construction, information would be distributed at the visitor center and within the park newsletter to inform the public about actions that have been implemented, to reinforce visitation and congestion management activities, to discourage ongoing social pull offs and trails activities, and to encourage long- term stewardship and resource protection.

Traffic and Transportation

- Traffic signs and pavement markings on park roads would be consistent with the standards contained in the Manual on Uniform Traffic Control Devices, as supplemented by the National Park Service Sign Manual (USDI National Park Service 1988). Special traffic calming devices and signs not yet recognized in these manuals may be installed with FHWA approval.
- A Traffic Control Plan would be developed in conjunction with the construction documents for use during the construction period(s) associated with roadside pull offs and parking area improvements. The plan would be provided by the contractor to the park superintendent for review and approval prior to implementation. This plan would include: proposed areas of construction and anticipated delays, safety considerations, estimated lengths of delay, and estimated number of vehicles stopped at any one point, as applicable to the construction. Construction- related traffic delays resultant from work at pull offs and parking areas would be limited to a maximum of 20 minutes in each direction. Flaggers would record delay times at stopping points and the results would be reported to the project engineer. Immediate access would be provided to any emergency vehicles.

If required, flaggers, pilot cars, signing, variable message signs and/or the newest technology, as appropriate, would be used to manage traffic around work at pull offs and parking areas.



Air Quality

- Fugitive dust would be controlled by periodic application of water to the construction areas. Water used for dust control would be obtained from approved sources outside the park.
- Construction equipment would be in satisfactory operating condition (i.e., it would be equipped with required safety components, and would not be leaking hazardous liquids or emitting hazardous or undesirable fumes above allowable local air quality legal limits).
- Construction vehicle engines would not be allowed to idle for extended periods of time (exact time would be determined in consultation between park resource staff and project engineer). Visitors stopped due to construction delays would be encouraged to turn off their engines.

The Environmentally Preferred Alternative

After careful review of potential resource and visitor impacts, and identification of proposed measures to mitigate impacts to natural and cultural resources, the National Park Service has determined that the environmentally preferred alternative is Alternative B. While some specific actions under Alternative A may achieve similar levels of protection for specific cultural resources, natural resources, and/or visitor experience to Alternative B, in aggregate, Alternative B best achieves the full range of national environmental policy goals as stated in Section 101 of the National Environmental Policy Act.

In accordance with *Director's Order (Do) 12*, the NPS is required to identify the "environmentally preferred alternative" in all environmental documents, including environmental assessments. The environmentally preferred alternative is determined by applying the six goals listed in the National Environmental Policy Act (NEPA) Section 101(b), which is guided by the Council on Environmental Quality

(CEQ). The CEQ provides that "[t]he environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources" (Federal Register 1981). NEPA Section 101(b) states that, "...it is the continuing responsibility of the Federal Government to...:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, whenever possible, an environment that supports diversity and variety of individual choice;
5. Achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities; and
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

Alternative A

Alternative A, the No Action alternative, represents the current management direction for Arches National Park. The existing use and development of the park is based on planning initiated and implemented through the *Arches National Park General Management Plan and Development Concept Plan* (USDI National Park Service 1989) and the *Visitor Experience and Resource Protection Implementation Plan* (USDI National Park Service 1995a).



Alternative A does not provide as much resource protection as Alternative B — resource impacts would be expected to increase with increasing use levels. Under Alternative A, current congestion and overcrowded conditions at pull offs, parking lots, and trailheads likely would continue to cumulatively impact natural and cultural resources in the long term. Visitor experience impacts also would likely increase under this alternative. This alternative also would not adequately address visitor safety issues associated with overflow parking and traffic congestion nor would it address the National Park Service’s goal of enhancing the quality of renewable resources. Therefore, when compared to Alternative B, Alternative A would not be as successful in satisfying NEPA goals 3 (attain the widest range of beneficial uses of the environment without degradation), 4 (preserve important natural aspects and maintain an environment that supports diversity and variety of individual choice), 5 (achieve a balance between population and resource use), and 6 (enhance the quality of renewable resources).

Alternative B

Compared to Alternative A, Alternative B would provide a higher level of natural and cultural resource protection while concurrently providing for a wider range of beneficial uses of the environment. For example, this alternative would improve public safety and ensure pleasing surroundings throughout the park by reducing traffic congestion and crowding at existing pull offs, parking areas, and trailheads, thus more successfully complying with NEPA goals 2 (ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings) and 3 (attain the widest range of beneficial uses of the environment without degradation).

Alternative B would also provide substantial cultural and natural resource benefits in accordance with NEPA goal 4 (preserve important natural aspects and maintain an environment that supports diversity and variety of individual choice) by formalizing pull off locations throughout the park, and thereby

discouraging spontaneous stopping and social pull offs that have resulted in disturbance to cultural resources and natural vegetation and soils. Implementation of this alternative would result in a disturbance of approximately 11,900 square feet of parkland for proposed improvements to pull offs and 15,000 square feet for parking areas. However, this alternative would have a long-term beneficial effect on cultural and natural resources by reclaiming approximately 201,689 square feet of currently disturbed areas at more than 170 social pull off locations and 18,095 square feet of disturbed landscape at parking areas, resulting in a net benefit of rehabilitated areas of 189,789 square feet and 3,095 square feet respectively.

Alternative B would more successfully promote the conservation of renewable resources compared to Alternative A by reducing vehicle fuel consumption. Increased use of public motorized interpretive tours would reduce fuel consumption by eliminating some private vehicle trips entering the park, particularly during peak periods. The type of vehicle proposed for motorized interpretive tours in Arches National Park would be highly fuel efficient with ultra low emissions and may run on alternative fuel (such as propane or bio-diesel). Therefore, Alternative B would be more effective in achieving goal 6 (enhance the quality of renewable resources).

Actions and Alternatives Considered but Dismissed

During the course of developing a transportation plan for Arches National Park, various potential actions and alternatives were considered but dismissed primarily because they could not be implemented within the next six years, an objective identified as important in the transportation implementation plan’s statement of purpose and need. Longer term actions that would require more time for analysis, planning, design, and implementation would not meet this objective. Actions and alternatives also were dismissed due to inconsistencies with the Arches



National Park General Management Plan and technical infeasibility.

Some actions and alternatives considered, such as a park- based shuttle system or implementation of a park reservations and ticketing system for key features, could not reasonably be implemented within the next six years. These actions would involve substantial changes that could have an appreciable effect on visitor experience, park resources, staffing and operations. As such, it was determined that the implementation planning effort should focus on other actions that could be achieved in the near term to begin to address traffic congestion and related impacts.

When it was determined that several of the actions and alternatives being considered were not consistent with the park's adopted General Management Plan, the NPS determined that the GMP would need to be updated before such actions could move forward (such as the addition of facilities inside the park to support an alternative transportation system or the development of new multi- use pathways between park features). These actions would need more detailed study and analysis prior to implementation, likely through a NEPA-compliant, General Management Plan update process initiated in the future by the National Park Service. This future planning effort would include detailed environmental analysis as well as additional public involvement.

Actions and alternatives previously considered during the planning process but dismissed because they were out of alignment with the stated purpose and need for action, inconsistent with the park's General Management Plan, and/or deemed technically infeasible included the following.

- *Phased, Park- based Shuttle System and Shuttle- based Visitor Management Solutions*

Potential options for a phased, park- based shuttle system and related shuttle- based visitor management solutions were considered as part of the overall transportation planning

process for Arches National Park. Considerations included the potential for certain routes of the shuttle system to be mandatory during peak visitation periods (similar to the system in place at Zion National Park). Because this action would have an appreciable effect on visitor experience and would take long than six years to implement, it was dismissed. It was determined that motorized interpretive tours should be evaluated as a potential near term option for providing another means of access and travel through the park. Visitor survey data, public comments, and other information were collected and initial analysis was completed related to the potential for a park- based shuttle system in the earlier stages of the transportation planning process.

- *In- park Improvements to Support a Park- based Shuttle System*

Implementation of a park- based shuttle would require construction of improvements inside the park to support operations, and further analysis, planning, design, and implementation likely would take longer than the six- year planning horizon identified for the transportation implementation plan. In addition, such improvements would be in conflict with the park's adopted GMP.

Physical improvements associated with a shuttle system could include modifications to roadways (shoulder widening), reconfigured parking areas, and the potential creation of new shuttle stops with bus platforms (thickened pavement), shade structures/shelters, benches, potable water, information and interpretation signs, bicycle racks, lean posts, and other elements. The potential implementation of these elements would need to be analyzed in further detail for possible environmental impacts, including potential impacts to visual qualities, visitor experience, and natural resources. Detailed plans would be needed to further assess site conditions and potential environmental impacts associated with these types of improvements. Because of the need for further



analysis, planning, and design efforts, these physical improvements likely could not be constructed within the desired six- year implementation timeframe. As such, these actions were dismissed.

- *Mandatory Reservations and Ticketing Options*

Options considered for introducing a park-wide reservations and ticketing program for management of congestion at key features during peak visitation periods were dismissed due to concerns such systems would be technically infeasible to implement and could not be implemented within the next six years.

- *Improvements for Bicyclists and Pedestrians*

Options considered for improving and enhancing access, safety, and mobility for bicyclists and pedestrians within the park included potential shoulder widening for bicycling on park roadways and multi- use pathways between key features and trailheads (where appropriate in consideration of various environmental conditions). It was determined that such actions would be inconsistent with the park's adopted GMP and could not be implemented within the next six years, so these were dismissed from further consideration.

- *Long- term ITS Applications*

Several potential long- term ITS applications were considered for Arches National Park, such as a parking management system with indicator loops and/or video monitoring installed at selected parking areas providing information that could be distributed to other areas of the park via monitors or variable message signs. Other potential long- term ITS actions included applications that might be developed in association with a park- based shuttle system. These long- term ITS actions were dismissed from further consideration because they could not be implemented within the six- year timeframe and also because some actions would not be technically feasible at this time due to the current status of technology in the region and at the park.



Table 2.7 – Comparison of Alternatives and Extent to Which Each Alternative Meets the Project Objectives

Objective	Alternative A – No Action Alternative	Alternative B – Transportation Implementation Plan – Preferred Alternative
<p>Protect the park's natural and cultural resources from potential impacts attributable to vehicles and visitor use, including in appropriate parking along roadways and parking lot edges.</p>	<p>The existing park road system and social pull offs would continue to operate in their current condition, with minor improvements on an annual basis. Pull off areas would not be formalized and paved; disturbed areas resulting from social pull off activity would be not be rehabilitated park- wide, but some rehabilitation would occur on an annual, incremental basis contingent upon available maintenance and operations funding.</p> <p>Social parking activities would continue in existing areas already affected by these activities, and potentially in new areas yet undisturbed. Broad-scale rehabilitation of areas that have been disturbed as a result of social parking and social trails would not occur.</p>	<p>21 pull off areas would be paved and improved and 5 additional pull off areas would remain unpaved and continue in informal operation.</p> <p>Over 170 existing social pull off locations would be removed with the disturbed areas being rehabilitated through protection, raking, contouring, soil amendments, and other treatments.</p> <p>The proposed parking area and pull off improvements would help to protect the park's cultural and natural resources from further damage due to social parking along roadsides and the related creation of social trails. Broad- scale rehabilitation of areas that have been disturbed by these activities would be implemented. Formalized pull off improvements with adjacent well- defined pedestrian areas would provide an area for visitors to stand to view the scenery and take photos, minimizing the level of social trails activity and related damage to resources.</p> <p>Although some new disturbance would result from construction of the proposed Sand Dune Arch parking area, this would be offset by removal of pavement and rehabilitation in several parking areas, as well as rehabilitation of areas of compacted, disturbed soils in parking areas and along the roadway.</p>



Objective	Alternative A – No Action Alternative	Alternative B – Transportation Implementation Plan – Preferred Alternative
Improve the visitor experience, including enhancement of access and travel mode choices to and within the park.	Only minimal parking area improvements would occur on an annual basis through maintenance and operations activities contingent upon available funding. Sand Dune Arch and Skyline Arch parking area improvements would not be constructed.	<p>Parking improvements, including a new parking area at Sand Dune Arch and enhancements at Skyline Arch would be constructed, enhancing access to park features. Redelineation of parking at the Windows/ Double Arch and Devils Garden would occur.</p> <p>Enhancement of access and travel mode choices to and within the park would be realized through implementation of the sightseeing/interpretive motorized tour program.</p>
Continue to accommodate the private automobile in the park and to enhance the experience of sightseeing and scenic driving.	<p>The park driving experience would continue as under existing conditions. Social pull off activities would continue at the current level and potentially increase. These activities cause disturbance to the natural resources at and beyond the roadside and create traffic hazards related to spontaneous stopping, and pulling off and pulling on to the roadway.</p> <p>No motorized sightseeing/interpretive tour programs would be implemented.</p>	<p>The park driving experience would be preserved and enhanced through proposed parking and roadside pull off improvements, as well as other proposed safety improvements.</p> <p>Motorized interpretive/sightseeing tours would expand visitor access and travel mode choice opportunities while at the same time enhancing visitor experience.</p>



Objective	Alternative A – No Action Alternative	Alternative B – Transportation Implementation Plan – Preferred Alternative
Improve traveler safety.	<p>No traffic calming treatments would be implemented, other than routine patrols and possibly some additional signs and visitor education/outreach.</p> <p>Existing social pull off activity would continue at the current level, continuing to create traffic hazards as described above.</p>	<p>Various traffic calming treatments would be implemented, including context sensitive pavement color and texture changes, (rumble strips), advance signing, and pedestrian crosswalks. Traffic calming improvements would improve traveler safety by serving to slow traffic in congested areas and areas of high pedestrian activity.</p> <p>Roadside pull off improvements and closure of existing social pull off areas would enhance traveler safety by eliminating motorists spontaneously pulling off and on the roadway in these areas. Proposed parking area and Intelligent Transportation Systems (ITS) improvements also would improve traveler safety thereby enhancing the visitor experience.</p>
Integrate park transportation plans with regional transportation planning activities.	Ongoing coordination and partnerships with regional interests would continue.	Ongoing coordination and partnerships with regional interests would continue and become strengthened through project and program implementation processes. If additional staffing and resources are committed to the park's transportation system, as proposed by the transportation implementation plan, a greater level of regional coordination would be realized.
Summary – Overall, does the alternative meet project objectives?	<p>No</p> <p>Social pull off activity would continue to occur and additional pull off areas would be created potentially causing impacts to natural and cultural resources. Traffic calming/safety improvements would not be implemented. Visitors would not be provided with an alternative means for accessing and traveling through the park other than by private vehicle.</p>	<p>Yes</p> <p>Traffic congestion overall would be reduced and transportation safety in general would be improved throughout the park. Proposed pull off improvements would reduce the potential for impacts to natural and cultural resources along park roads. Park visitors would have expanded opportunities for travel through the park through the motorized interpretive tour program.</p>



Table 2.8 – Summary of Environmental Consequences

Impact Topic	Alternative A - No Action Alternative	Alternative B – Transportation Implementation Plan – Preferred Alternative
Biological Soils Crusts	Under Alternative A, the No Action Alternative, there would be minor to moderate, short- and long- term adverse impacts on biological soil crusts, primarily as a result of existing and ongoing social pull off, parking, and pedestrian activities. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse. There would be no impairment of park resources or values related to biological soil crusts.	<p>Under Alternative B, there would be moderate, short- term and long- term, adverse effects on biological soil crusts inside the park, primarily as a result of construction of the Sand Dune Arch parking area. However, formalizing pull off areas and adjacent pedestrian paths would reduce impacts on biological soil crusts by keeping visitors and vehicles in defined areas.</p> <p>There would also be the potential for adverse effects on biological soil crusts outside the park with the new centralized operation and maintenance facility in Moab to support motorized tours. However, since the site location is unknown, the potential intensity and duration of these effects is not known at this time, and the location of this facility outside the park would result in beneficial effects inside the park. Other long- term beneficial effects would occur as a result of proposed actions of Alternative B. Overall, short- and long- term, cumulative impacts would be moderate and adverse. There would be no impairment of park resources or values related to biological soil crusts.</p>
Visual Resources	Under Alternative A, No Action, there would be negligible to minor, long- term adverse impacts on the park's visual character and resources, including night skies. Overall, short- and long- term, cumulative impacts would be negligible to minor and adverse. There would be no impairment of park resources or values related to visual quality.	Under Alternative B, there would be negligible to minor short- term and negligible to moderate long- term adverse impacts on visual quality both within and outside the park. Some long- term beneficial effects would occur. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse. There would be no impairment of park resources or values related to visual quality.



Impact Topic	Alternative A - No Action Alternative	Alternative B – Transportation Implementation Plan – Preferred Alternative
Visitor Use, Visitor Experience, and Recreational Resources	Alternative A would result in minor to moderate, long- term adverse impacts to visitor use, visitor experience and recreational resources. The level of impact would be expected to become more intensive as the level of visitation increases and conditions at key features and along the park roadways become more congested. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse, although some beneficial effects have resulted from past, present and reasonably foreseeable cumulative actions. The National Park Service does not analyze visitor use, visitor experience, or recreational values for impairment.	Alternative B would result overall in short- term, minor to moderate adverse effects during construction of proposed improvements that would be mitigated. Proposed visitor access management would result in long- term, minor to moderate, adverse effects to some visitors at localized areas of the park during peak visitation periods. These adverse effects would be offset by substantial long- term beneficial effects to all park visitors and visitor experience, as well as park resources. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse, although beneficial effects would continue to be realized from past, present and reasonably foreseeable actions combined with Alternative B. The National Park Service does not analyze visitor use, visitor experience, or recreational values for impairment.
Transportation and Traffic Conditions	Alternative A would result in minor to moderate, long- term, adverse impacts related to traffic and transportation, with the level of effect depending on future visitation and congestion levels and conditions at key features and throughout the park. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse (although some localized beneficial effects have resulted from recent improvements at the park entrance and past park improvements). There would be no impairment to park resources or values related to transportation and traffic conditions.	Long- term beneficial effects related to transportation conditions and traffic flows and safety would occur under Alternative B. These effects would be expected as a result of reduced traffic congestion in parking areas, improved safety on the park roadways from pull off and traffic calming improvements, and improved operations of the park's overall transportation system. Minor to moderate, short- term adverse effects would occur during construction, but would be mitigated. Overall, short- term, cumulative impacts would be minor to moderate and adverse, offset by long- term beneficial impacts resulting from recent past and improvements at the park and proposed actions of Alternative B. There would be no impairment of park resources or values.



Impact Topic	Alternative A - No Action Alternative	Alternative B – Transportation Implementation Plan – Preferred Alternative
Park Operations	Under Alternative A, there would be long- term, minor to moderate adverse impacts to park operations that would need to be mitigated through additional staffing and resources. Overall, long- term cumulative impacts would be minor to moderate and adverse. The National Park Service does not analyze park operations for impairment.	Under Alternative B, beneficial, long-term effects on park operations would occur, resulting from reduced overall demand for park staffing and resources focused on transportation and traffic management. Additional staffing and resources would be needed to mitigate short- term, minor to moderate, adverse effects during the implementation period. Overall, short- term, cumulative impacts would be minor to moderate and adverse, offset by mitigation, as well as long- term beneficial impacts resulting from recent improvements at the park entrance and the proposed actions of Alternative B. The National Park Service does not analyze park operations for impairment.
Socioeconomics	No beneficial or adverse, short-term or long- term impacts to socioeconomic conditions would be expected under Alternative A and current trends in economic growth and development would be expected to continue. Overall, no beneficial or adverse, short- term or long- term cumulative impacts would be expected. The National Park Service does not analyze socioeconomic values for impairment.	Implementation of Alternative B would be expected to create long- term beneficial effects on socioeconomic conditions in the region. The proposed motorized interpretive tour would be an important contributor to the anticipated beneficial effect. Short- term beneficial socioeconomic effects likely would occur during the construction period of proposed improvements. Overall, long-term and short- term, beneficial cumulative impacts would occur. The National Park Service does not analyze socioeconomic values for impairment.
Land Use	Under the No Action alternative, there would be either no or negligible, long- term, adverse impacts on land use in the park. Overall, long- term, cumulative impacts would be negligible to minor and adverse in the park and surrounding vicinity. There would be no impairment of park resources or values related to land use.	Alternative B would result in long- term, minor to moderate, adverse effects, as well as long- term beneficial effects on land use. Short- term adverse impacts to land use during construction would range from negligible to minor. Overall, long-term, cumulative impacts would be minor to moderate and adverse. There would be no impairment of park resources or values related to land use.



Introduction

This chapter describes existing conditions, including resources and values that potentially could be affected by the alternatives presented in this document. The impacts of alternatives on each of these resources and values are described in Chapter 4, Environmental Consequences. Detailed information on resources in Arches National Park may be found in the park's *General Management Plan* (GMP), 1989, *Visitor Experience and Resource Protection Implementation Plan*, 1995, and other park plans and studies. A summary of the resources associated with this follows.

Description of Affected Environment

Soils and Biological Soils Crusts

Soils

A large percentage of Arches National Park's land surface is exposed bedrock or shallow soil over bedrock with sparse land cover. The arid climate of the area, with only eight inches of annual precipitation, results in sparse vegetation and poorly developed soils. Large areas of slickrock cover approximately 11 percent of the park and are largely devoid of soil and plant life.

Soils in the park are derived from local sandstones and are classified as well- drained, fine- grained sandy loams of eolian, residual, and alluvial origin with little organic material. The soils are a yellow- red color and soil depth varies greatly.

Approximately 90 percent of the soils in the park are in the Rizno- Begay Complex. These soils are fine sandy loams characterized by 2 to 10 percent slopes and are closely intermingled. Rizno soils are found on ridges and close to rock outcrops. Beday soils are found in open areas and are deeper. Rizno soils are 4 to 20 inches in depth, while Begay soils are as deep as 60 inches. Both soils are well drained and contain less than one percent organic matter. These soils in the park are generally very susceptible to damage by trampling

from unplanned foot traffic at areas of concentrated visitor use, such as parking areas, scenic overlooks, campgrounds, and trails.

Salt Valley is covered mostly with sandy deposits transported by wind and water. The northern portions of the valley and lower slopes have surface exposures of shale and clay. This material forms soil that expands when moisture is added, resulting in a high shrink to swell ratio that can cause heaving of road surfaces. Portions of the park Main Road in Salt Wash and Delicate Arch Road cross these unstable soils.

Biological Soil Crust

Biological soil crusts cover much of Arches National Park. Soil crusts are common on sandy soils in the pinyon/juniper areas and in shrublands. These dark brown crusts may represent 70 to 80 percent of the living ground cover in the cold deserts of the Colorado Plateau regions. The soil crusts consist of a variety of organisms, including cyanobacteria, lichens, algae, mosses and fungi, which form an intricate web of filaments that increase soil stability, increase rainfall infiltration, fix nitrogen in the soil, and protect the soil surface from wind and water erosion. These functions contribute to the park's ecosystems by increasing nitrogen and other nutrients for plant growth and enhancing germination and establishment of some vascular plants.

The nitrogen- fixing role is particularly important in desert ecosystems where nitrogen levels are low and often limit the ecosystem's productivity.

Construction activities, motor vehicles, foot traffic, and livestock easily damage soil crusts. When crusts are dry, they are very brittle and easily crushed. Breaking the fiber connections destabilizes the underlying soil making it more susceptible to both wind and water erosion, which may affect soil fertility and moisture retention, adversely affecting the establishment and survival of vascular plant seedlings. Crushed soil crusts also contribute less nitrogen and organic matter to the ecosystem.



The natural recovery of soil crusts can take many years. Under the best of circumstances, a thin veneer, consisting of one or two cyanobacterial species, may return in five to seven years. Full recovery of all of the crust components may take more than 250 years depending on the type and extent of disturbance, availability of nearby inoculation material, and temperature and moisture regimes.

Visual Resources

Visual resources are the visible physical features of a landscape that impart scenic value.

Southeastern Utah is known worldwide for its unique scenic qualities and unusual landscape features. It is a land of deep canyons, rock arches, towering rock formations, badlands, and expansive panoramas. Many of the more spectacular features are preserved in national and state parks or monuments including Arches National Park (US Department of Energy 2004).

The primary scenic attractions at the park are the arches. Water and ice, extreme temperatures, and underground salt movement are responsible for the sculptured rock arches of Arches National Park. Other geologic features and panoramic views also contribute to the scenic richness of the park. The park has pronounced angular topography and contains several horizontal layers of sedimentary rocks with steep escarpments and cliffs (USDI National Park Service 2002). The roads, designated trails, and viewpoints in the park provide panoramic and dramatic views of these unique scenic features for park visitors. Some of the most prominent visual features include Park Avenue, Courthouse Towers, Petrified Dunes, Salt Valley, Delicate Arch, Fiery Furnace, Devils Garden, and the distant La Sal Mountains.

Visitor Use, Visitor Experience, and Recreational Resources

Arches National Park is a popular year- round destination for people from around the world. The park offers a variety of recreational experiences including sightseeing, viewpoints/photo stops, hiking, interpretation

(Visitor Center and other locations in the park), picnicking, special tours (Fiery Furnace and others), camping, rock climbing, bicycling (on established park roads), and access to the backcountry. Visitors are able to enjoy many of the park's arches and features while driving along park roadways, but are encouraged to get out of their cars and walk to "*grasp the aura of time and silence and experience the scale so special here*" (Arches National Park brochure). Arches National Park is a great family park, with several trails and trail loops that offer moderate and easy dayhiking experiences.

A new visitor center opened in September 2005. It includes an expanded area of interpretive exhibits. Also, a new visitor entrance station was completed in 2004, which vastly improved the efficiency of entering the park and reduced the congestion of cars on the park's entry road.

Visitors are cautioned about summer daytime temperatures, which can reach 110 degrees F and encouraged to carry water on trips to the park. Drinking water is available at the Visitor Center, campground, and the Devils Garden Trailhead.

The park is surrounded by public lands managed by the Bureau of Land Management (BLM) where additional hiking, mountain biking, camping, rockclimbing, "jeeping"/four- wheel- driving, and sightseeing opportunities can be enjoyed by visitors. The Moab region is known as one of the premier destinations for mountain biking and "jeeping"/ four- wheel- driving in the country, if not the world. Millions of visitors come to the area each year to enjoy these and other activities.

There is regional interest in increasing visitation to the region overall, as well as interest in spreading visitation out throughout the year (beyond peak periods and into seasons that are off- peak periods). Arches National Park works closely with tourism interests including the Grand County Travel Council and Utah Tourism Council to develop strategies for marketing and promoting regional tourism experiences. Arches National Park has been working with these interests to encourage travel to the area during off- peak periods.



The park manages visitor experience through the provisions of the GMP and the Visitor Experience and Resource Protection (VERP) Implementation Plan. The VERP program provides support for informed, defensible decisions about visitor use and provides a framework for cost-effectively coordinating planning, research, monitoring, and management actions. Under the VERP plan, various indicators have been monitored throughout the park to determine if visitor experience and resource protection goals are being met. The park has monitored these standards and indicators for the past several years; however future annual funding for ongoing VERP monitoring is not guaranteed. Refer to Chapter 2 for a summary of monitoring results from past years.

Trends in Park Visitation and Visitation Forecasts

An analysis of past trends in park visitation was conducted to anticipate potential future visitation levels that the transportation plan and park management will need to respond to. The results of this analysis and forecasting are summarized below.

Since the 1960s, visitation at Arches National Park has increased in a series of peaks (periods of high visitation) and valleys (periods of low visitation). After a period of rapid growth, park visitation tended to drop and stabilize for a few years then experience another accelerated growth cycle. This cycle continued up through the mid-1990s when growth in visitation began to level off. From 1993 through 2005, annual visitation rates have stayed relatively constant.

In 1982, Arches National Park experienced a visitation of 339,415 people. In 1993 the visitation level was 773,678. Average annual growth within that eleven year span was 11.6 percent. From 1993 to 2005, the average annual growth was .09 percent.

Between 1982 and 1999, the park experienced a 9.2 percent average annual growth rate, but overall between 1982 and 2005, the average annual growth rate was 5.7 percent. Since 1991, visitation has fluctuated within a range of between 700,000 and 870,000 visitors per year, with the peak visitation occurring in 1999.

1999 was one of the busiest years on record with 869,980 visitors. Park staff reported many problems and challenges associated with managing parking, traffic congestion, and visitor experience in that year. These problems included crowding at key features, congestion on park roads and in parking areas, and damages to soils and vegetation from social pull off and parking activity at roadsides. These types of problems continue annually at the park during peak visitation periods in spring, summer, and on holiday weekends. Easter weekend is known as one of the busiest weekends in the park, along with the traditional holiday weekends of Memorial Day and Labor Day.

Visitation in 2005 was 781,672, up by 6.6 percent above the 2004 visitation of 733,131 and up by 3.2 percent above the 2003 visitation of 757,781.

Figures 3.1, 3.2 and 3.3 illustrate visitation trends since the 1960s.



Figure 3.1 — Arches National Park Visitation from 1967 - 2005

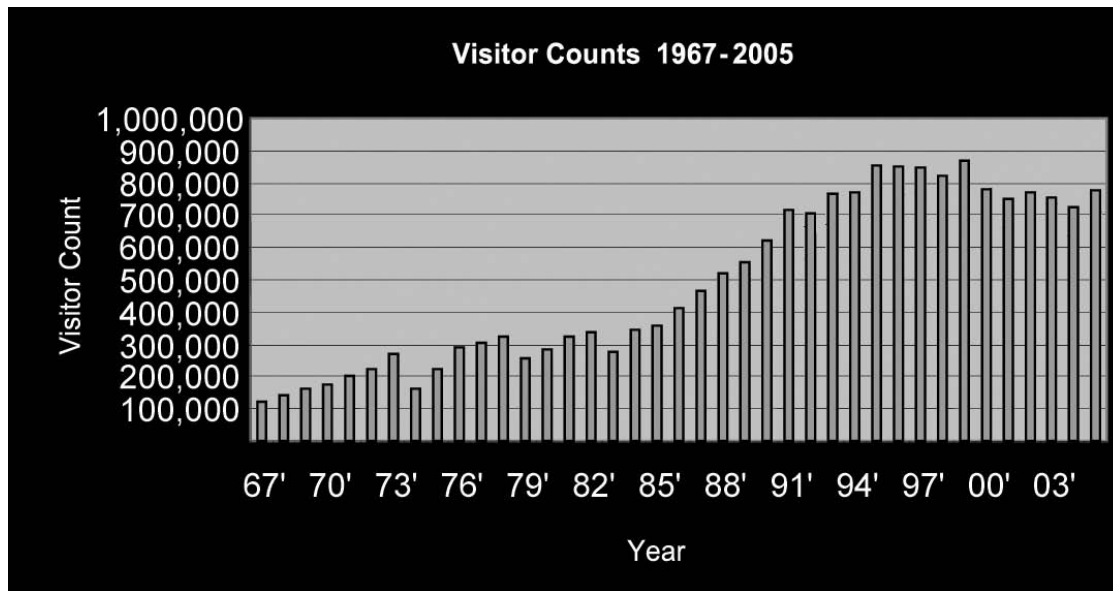


Figure 3.2 — Arches National Park Visitation Growth from 1982 - 2005

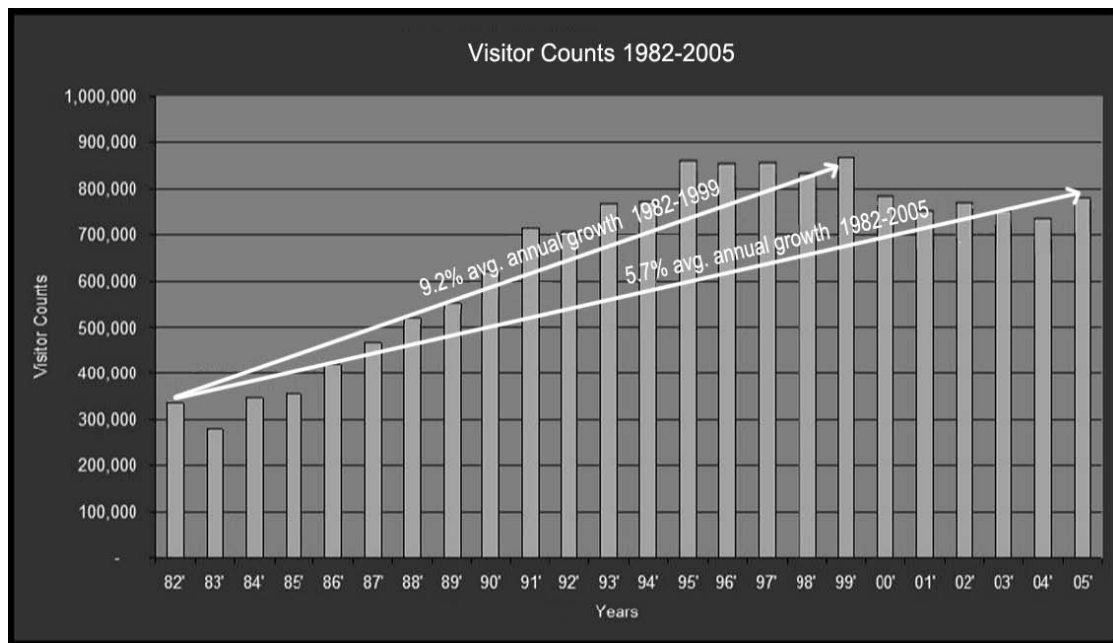
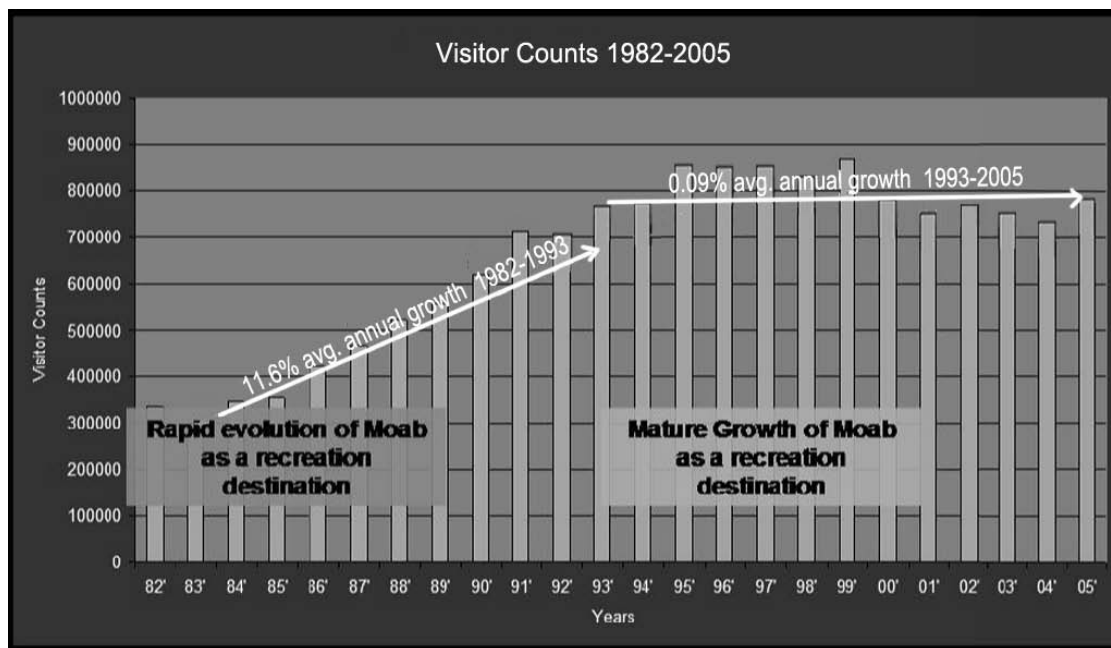


Figure 3.3 — Arches National Park Visitation Growth Analysis from 1987- 2005



Breaking down the annual growth of the last ten years into months, as shown in Figure 3.4 on the next page, illustrates that park attendance has increased in the off- peak season. Summer increases were not experienced over the last ten years.

An evaluation of the data prior to the recent down- turn of the economy, as shown in Figure 3.5 (depicting visitation through 1999), illustrates similar gains during the off- peak season; however, there still was growth in attendance during the peak summer months.

Anticipating growth in visitation over the next twenty years for Arches National Park is a difficult task. Many factors influence park attendance. The analysis of trends above has provided a frame of reference for possible growth patterns that may occur in the future, but the actual levels that visitation may increase, decrease, or remain constant are unknown.

Because of the challenges associated with predicting a specific growth rate for the park, three potential growth scenarios (low, medium and high) were evaluated for Arches National Park and are depicted in Table 3.1. The low growth scenario anticipates annual monthly growth in attendance to reflect that which has been experienced over the last ten years. Medium and high growth assumption increased each month by one half and one percentage point, respectively. It is anticipated that the actual growth rate of visitation at the park will fall somewhere within these scenarios.

This analysis of potential growth scenarios helps the park anticipate possible future visitation in order to help inform planning for the appropriate types of management strategies and actions. For example, the transportation implementation plan includes some proposed actions that may not need to be implemented if growth levels remain flat or low, but others that may be needed if growth levels are higher.



Figure 3.4 — Park Attendance Analysis 1992- 2001

(Showing Percentage Increases in Visitation per Month for the Period)

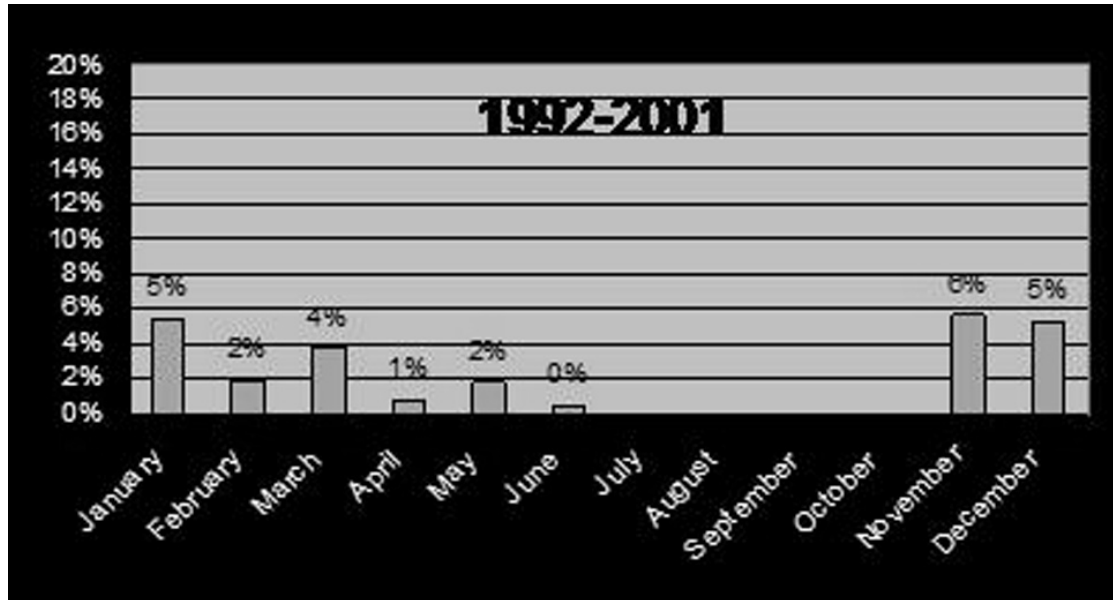


Figure 3.5 — Park Attendance Analysis 1992- 1999

(Showing Percentage Increases in Visitation per Month for the Period)

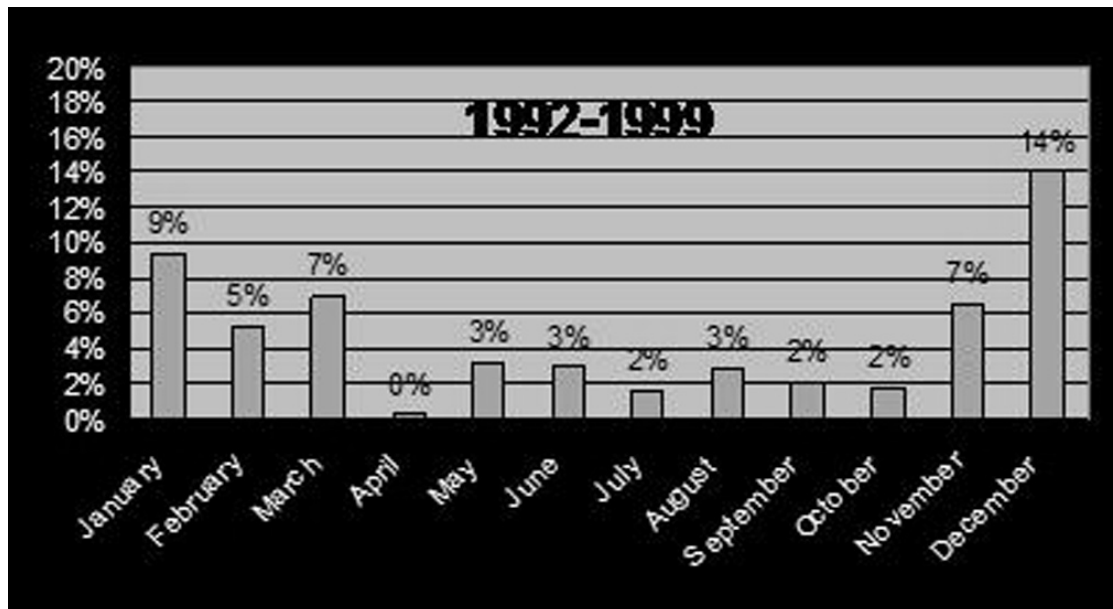


Table 3.1 — Potential Growth Scenarios for Arches National Park

	Low	Medium	High
January	6.50%	7.00%	7.50%
February	3.50%	4.00%	4.50%
March	4.50%	5.00%	5.50%
April	0.50%	1.00%	1.50%
May	1.50%	2.00%	2.50%
June	1.50%	2.00%	2.50%
July	0.50%	1.00%	1.50%
August	0.50%	1.00%	1.50%
September	0.50%	1.00%	1.50%
October	0.50%	1.00%	1.50%
November	5.50%	6.00%	6.50%
December	9.50%	10.00%	10.05%
Annual Growth Rate	1.86%	2.50%	3.11%

Visitor Characteristics

Gaining an understanding of Arches National Park visitor characteristics helped to inform the development of strategies and actions proposed in the transportation implementation plan.

Results of the 2003 Visitor and Travel Surveys

In April and August of 2003, visitor surveys were conducted at Arches National Park specifically to provide background data and information to support development of the transportation implementation plan. The primary purpose of the surveys was to understand park visitor characteristics, experiences, preferences, and perceptions.

The survey asked where they go when they come to the park, as well as specific questions about their experience, and whether or not they would ride a shuttle at the park. Surveys were conducted using an “exit” methodology. Visitors in vehicles and on bicycles were stopped at the Park Avenue parking area before they left the park and asked to voluntarily participate in the survey. Surveys were also conducted at the campground covering many of the same questions in the general visitor survey. An employee survey was also conducted during the same timeframe as the visitor surveys. An analysis of the results of these surveys is available from Arches National Park as a

separate report. Survey findings are summarized below.

General Findings

- The 2003 survey findings indicated that April visitors tended to travel with fewer people per vehicle (average of two people per vehicle), compared to an average of three people per vehicle during August.
- The average age of visitors was 46 years in April and 37 years in August. 42 percent of visitors were 55 and over in April and 21 percent were 55 and over in August. This reflects the affect of the seasonal school calendar on visitation, with summer being a popular time for family travel due to summer break.
- Primary visitor activities recorded were photography, hiking and picnicking, regardless of season.
- Most visitors surveyed were first- time visitors to the park (57 percent in April and 69 percent in August). The 43 percent of repeat visitors in April reported an average of 7 visits to the park. August repeat visitors reported an average of 5 visits to the park.
- Most park visitors were from outside of Utah. Out- of- state visitors ranged from 85 percent in April to 91 percent in August.
- Foreign visitors (outside the USA) were more prevalent during August (21 percent of the total visitors). Most foreign visitors indicated England, Switzerland, and France as their home countries. (The park reports that many visitors come from Germany as well.)
- 42 percent of visitors indicated they were staying in private and public campgrounds in April, while 43 percent indicated they were staying in motels. In August, more visitors were staying in motels (62 percent of the total).
- 35 percent of respondents in April indicated they would be staying at the park for less than one day, and 31 percent indicated they would be staying for one full day. In August, park the duration of park visits got shorter – 47 percent



indicated they would be staying less than one day and 29 percent indicated they would be at the park for one full day.

- Most people in April and August indicated they would visit the park in the morning rather than other times of the day.
- The duration of stays in the Moab area were three days on average in April and two days on average in August.

Popular Park Attractions and Visitor Perceptions about Attractions

- The most popular attractions at the Arches National Park were similarly listed by April and August respondents. The attractions mentioned as places respondents visited in the park (in order of most mentioned to least mentioned) were:
 - The Windows
 - Balanced Rock
 - Devils Garden
 - Delicate Arch Viewpoint; Park Visitor Center (tied)
 - Wolfe Ranch/Delicate Arch Trailhead
 - Courthouse Towers; Park Avenue Trailhead (tied)
 - La Sal Mountain Viewpoint
- Regional attractions (in decreasing level of visitor interest) were:
 - Downtown Moab
 - Canyonlands National Park
 - Dead Horse Point State Park
 - BLM recreation sites along Highway 128
 - Various other BLM recreation sites

Refer to Figures 1.1 and 1.2 in Chapter 1 for the locations of these sites within proximity to Arches National Park.

- Most visitors did *not* report that parking areas at the Visitor Center, Windows, Wolfe

Ranch/Delicate Arch Trailhead, or Devils Garden seemed full when they first arrived at them in either April or August, and most visitors indicated that they got to see all the sites they wanted to while at the park.

- Most visitors had a positive experience at the main attractions, responding that problems related to crowding, parking, behavior, and resource damage did not detract from their visit. However, 10 to 15 percent of visitors reported parking and crowding problems at Devils Garden and Windows in April and August.
- When asked about how their willingness to use advance information about crowding at park attractions, the majority of respondents indicated that they would likely use such information to schedule their trips to Arches on a different day or during a different time of the day.
- Most visitors were not willing to use a reservation system to reserve a specific time to visit the park to avoid crowds (65 percent said no in April and 66 percent said no in August). 21 percent of April respondents said they would use a reservation system and 14 percent said they were not sure. 23 percent of August respondents said they would use a reservation system and 11 percent said they were not sure.
- 85 percent of visitors in April said they would visit Arches National Park again. 75 percent of visitors in August said they would visit the park again.
- While the existing levels of congestion at park sites were not listed as a detracting factor to respondents' visits, reduced congestion was listed by 37 percent of April visitors and 34 percent of August visitors as an important factor in their decision to visit the park again.

Transportation Topics

- Of the visitors surveyed (not including visitors on tour buses), most Arches National Park visitors (90 percent) arrived at the park by car, truck or sport utility vehicle. About 8 percent arrived by recreational vehicle (RV), and 2 percent by bicycle or other means.



- Six percent of April visitors used bicycles in the park, while only one percent of August visitors mentioned their use of bicycles. The national average of people who bicycle is one percent, so the April usage of six percent represents a fairly high level of bicycle use comparatively.
- About 81 percent of the April visitors and 44 percent of the August visitors encountered bicyclists while driving through the park. Most visitors (about 80 percent) said it was not difficult to share the road with bicyclists.
- When asked about the use of bicycles if bike lanes or paved trails were provided, 39 percent of visitors in April and 38 percent in August indicated they would bicycle to park sites if facilities were available.
- 29 percent of the visitors in April and 30 percent in August indicated that they would bicycle between Moab and the park if a safe route were available (i.e. separated bridge over the Colorado River, and pathway along Highway 191, etc.)
- 54 percent of April visitors and 50 percent of August visitors indicated they would use a shuttle system at Arches National Park and the surrounding area.
- The majority of survey respondents stated that the following elements would encourage their use of a shuttle system:
 - Frequent service (67 to 69 percent)
 - Reliable/on- time service (67 to 72 percent)
 - Guides and information on shuttles (61 to 71 percent)
 - Shelter/shade at shuttle stops (56 to 69 percent)
 - Benches/seating at shuttle stops (58 to 66 percent)
 - Safe places to leave vehicles (67 percent)
- The majority of respondents stated that the desired frequency between shuttle pick- up

and drop- off at popular park attractions was 15 minutes.

- 29 percent of respondents were interested in a shuttle service that would provide access throughout the entire park compared to 27 percent who were interested in shuttle service to the most popular attractions. 29 percent wanted a shuttle connection to Moab.
- 47 percent of April respondents and 54 percent of August respondents said they would be willing to pay a modest fee (less than \$5.00) to ride the shuttle (in addition to paying the park entrance fee).
- Even though there was a relatively strong interest in shuttle service, the majority of survey respondents (63 percent in April and 64 percent in August) stated that the ability to use their car in the park would be an important factor in their future visits.

Summer 2003 Visitor Study

The National Park Service conducted a separate visitor study during the summer of 2003 as part of the Visitor Services Project. The full results of this survey are available online at: <http://www.psu.uidaho.edu>

Findings of interest from the 2003 summer visitor study included the following.

- 76 percent responded that visiting Arches National Park was their primary reason for visiting the Moab area.
- 94 percent indicated that taking a scenic drive/sightseeing would be the most common activity they would participate in during their visit to Arches, followed by walking/hiking (86 percent), and then photography/painting/drawing (66 percent).
- 50 percent of visitors spent between \$1.00 and \$200.00 during their visit (within a one hour drive from the park); 32 percent spent \$301.00 or more. The largest portion of the expenditures were for hotel/motels (34 percent), followed by restaurants/bars (19 percent).



- The average visitor group expenditure was \$372 per visit.
- 75 percent of visitors indicated they spent between two and six hours in the park, while 21 percent stayed seven hours or more.
- 94 percent rated visitor services as “very good” or “good” on this trip. Less than 1 percent of visitor groups rated services as “poor” or “very poor.”
- Various comments were received, one comment that was highlighted in the summary report stated a need for *“more emphasis on non-motorized enjoyment of the park. Increase length of trails between parking areas and features by moving parking lots.”*

Transportation and Traffic Conditions

Regional Transportation System

Most visitors travel by personal vehicles to get to the park via US Highway 191, which connects to Interstate 70, about 27 miles north of the park and Moab, about five miles southeast of the park. Highway 191 continues south of Moab, toward Monticello and beyond and is a frequent route for travelers of the Grand Circle for access to other national and state parks and recreation sites (such as Canyon Rims, Hovenweep, Mesa Verde and others).

Other nearby highway routes include Highway 128, which joins Highway 191 approximately two miles southeast of the park entrance and heads toward the northeast. Travelers frequently use Highway 128 as a principal route between Moab and Grand Junction, Colorado. Visitors in the Moab area use Highway 128 for access to the BLM recreation sites, such as Negro Bill Canyon, a few miles northeast of the Highway 191 junction.

The Potash Road (Route 279) joins with Highway 191 less than one mile south of the park and heads toward the southwest, providing access to various other BLM recreation sites.

Visitors drive to the park from other places throughout the country or from cities in Utah and Colorado where they have arrived by commercial air, bus, or train. An

international airport is located in Salt Lake City, Utah, four hours driving distance from the park. Another airport with frequent commercial flights is located in Grand Junction, Colorado, about two hours driving distance from the park. A smaller airport, located in the vicinity of and serving Canyonlands and Arches National Park, serves private charter flights, flight tour companies, and other flight operations.

Visitors can also travel to the area via commercial bus and van service. Greyhound offers service along I-70, making stops in Grand Junction, Colorado and Green River, Utah, and commercial van services operate between Salt Lake City and Moab. Commercial passenger train service is available via Amtrak, which also stops in Green River, Utah and Grand Junction, Colorado. Rental vehicles can be obtained in Grand Junction, Colorado for access to Moab and the park. There currently is no public transportation service to and from the park.

The Moab region is a major focal area for mountain biking and road bicycling and bicycle use in the area continues to grow with the implementation of several regional improvements. A pedestrian/bicycle path was recently constructed along Highway 191 between the park and the junction with the Potash Road. A pedestrian/bicycle bridge over the Colorado River to Lions Park (on the east side of the river) will be constructed in the near term. The county plans to improve Lions Park as well, and the uranium mine tailings reclamation site across Highway 191 from Lions Park is also planned for redevelopment in the long term future. An additional bicycle/pedestrian path will be developed along Highway 128 to the Negro Bill Canyon site, and eventually a shared use path will be constructed from the new bridge over the river into Moab along Highway 191 to the southeast. This will create a continuous, separated route of access for pedestrians and bicyclists for the full five-mile distance between the town and the park. With the full construction of the regional pathway system, including the link from Moab to the park, it is anticipated that more visitors will come to the park on bicycle, as well as some on foot.

Currently for access to, from, and within the park, the primary mode (for sightseeing and access to park features and recreation sites) is travel by private vehicle, but some visitors do travel through the park via bicycles and also between features in the park on foot.



Roadway Conditions in the Park

As visitors enter the park off of Highway 191, they travel through a new entrance station, completed in 2004. Construction of the new entrance has vastly improved the efficiency of entering the park and has reduced traffic congestion on the park's entry road. A previous problem related to queuing vehicles stacking up and extending out onto the highway at the entrance has been resolved.

Additional park access for four- wheel- drive vehicles is available at a single point along the west boundary of the park via the Willow Flats road – an unpaved route. Some recreationists enter the backcountry by traveling through the park and taking unpaved roads such as the Salt Valley Road to lands beyond. Some visitors also enter and leave the park via this location.

There are 11 roadways (including paved and unpaved routes), 24 parking areas, and 2 main intersections in the park. From the Visitor Center area to the top of the grade, the main park road (also known as Route 10) ascends the steep grade in a switch- back pattern. Because the road cuts through various rock features, there are minimal shoulders and few areas for pulling off within this stretch to the two- lane, two- way road.

Upon reaching the top of the grade, roadway lanes vary from approximately 9.5 to 11 feet in width with paved shoulders that vary in width from approximately 12 to 18 inches throughout the park. In some cases there is minimal shoulder width adjacent to the travel lanes.

Bicycling is allowed on park roads, however, no signing or striping exists related to bicycle usage and lane widths are typically less than the 14 feet required by the American Association of Highway and Transportation Officials (AASHTO) recommend for shared vehicle and bicycle use. AASHTO and NPS standards require minimum four- foot paved shoulders when a route is intended for bicycling.

The main park road is approximately 17.54 miles in length. The speed limit varies from 15 mph to 20 mph in the first two miles, and then ranges

from between 30- 45 mph for the remainder of the main park road.

The Windows road is 35 mph in both directions up until the point that the road enters the parking loop area, where the posted speed limit becomes 15 mph.

The eastern portion of Delicate Arch road was constructed more recently than other roads in the park, and its cross section was designed and constructed in accordance with Federal Highway Administration (FHWA) standards with lane widths from 11 to 12 feet in width and paved shoulders at least two feet wide on either side of the roadway. The Delicate Arch road speed limit ranges from 15 to 35 mph.

The posted speed limit for the Devils Garden parking/loop road at the end of the main park road is 15 mph.

Park rangers report that visitors often exceed posted speed limits on roads throughout the park, particularly on downhill segments of the main park road and along the more recently constructed portion of the Delicate Arch road.

Roadside pull off areas are provided on all park roads. Many of these roadside areas are paved pull offs where sightseeing visitors stop for a brief period of time to enjoy the scenery and take photographs. Over the years, many “social” roadside pull offs have been created by visitors. These are unimproved areas where people have pulled their vehicles off the main road and shoulder. Studies identifying and assessing these locations have been completed and are described in more detail Chapter 2.

A two- part study of park roads completed by RS Engineering in 2002 (*Arches National Park Draft Engineering Study for Roads and Arches National Park Draft Traffic Engineering Safety Study*) was prepared for Arches National Park under the direction of the US Department of Transportation. The study efforts analyzed the safety and function of park roads and made recommendations for change. Recommended roadway improvements included shoulder widening to a consistent width (18 inches is the desirable width) and



resolving sight distance and roadside drop-off problems in a few locations. The total estimated cost for needed short-term improvements cited in the study was \$33,950,000 (in 2001 dollars). Arches National Park has prepared a project funding request to implement some of the improvements recommended by the study efforts and anticipates completing this work within the next five to six years.

Traffic Volumes

Table 3.2 shows seasonally adjusted average daily traffic (SAADT) volumes. Approximately five to eight times per year, during holiday weekends and special events, these numbers can be tripled. Even when tripled, average daily volumes are well within the standard traffic volumes that can be adequately accommodated by the roadway built to its current standard. There is no need to increase traffic capacity through the addition of travel lanes, passing areas, turning lanes, or other facilities. However, it should be noted that the analysis of park roads in 2002 recommended shoulder widening and various minor improvements to the roadway that would considerably improve its function and safety.

Table 3.2 — Seasonally Adjusted Average Daily Traffic

Roadway	SAADT	
	2002	2022
Main park road	1870	2850
Windows Road	1500	2280
Delicate Arch Road	1500	2280
Devils Garden Loop	1500	2280

Transportation System Capacity Analysis

A comparative analysis between visitation forecasts and the park's transportation system capacity was completed during the development of this transportation implementation plan. The transportation system capacity for Arches National Park was calculated by multiplying the total

number of parking spaces available at park features and trailheads by the average vehicle occupancy (currently 2.4 persons per car) and a turnover rate of 3 times per day – a methodology originally outlined in the park's GMP.

Although average parking turnover rates at the parking areas of some of the more popular features in the park are greater than 3 times per day, particularly during peak visitation periods, the turnover rate of 3 times per day was used to calculate overall system capacity because it is more representative as an average daily figure across all parking areas in the park throughout all seasons.

Table 3.3 provides an updated count of the prescribed parking area capacities within the park based on the capacities proposed by the park's GMP, VERP, and field evaluation of existing conditions. Table 3.3 depicts the prescribed level parking for each parking area assuming that the areas eventually would be formally striped, enforced, and reconfigured to contain parking at the capacities shown (as recommended in the GMP and VERP planning documents).

Existing parking levels at Devils Garden, Fiery Furnace, Window/Double Arch, and other areas in the park sometimes exceed the prescribed levels shown in Table 3.3 below because visitors park informally along the roadside and in overflow areas. Several of the parking lots currently are not fully striped. In some cases, parallel parking areas are wider than they need to be and as such, visitors park perpendicularly in those areas on busy days, increasing the effective capacity of that area. Because of the informal nature of parking during congested times at the park, the effective existing parking capacities can not be quantified.

Consistent with the provisions of the GMP and VERP, the park intends to continue to work towards managing parking capabilities in accordance with the levels shown in Table 3.3.

In Table 3.3, oversized vehicle (or RV) spaces count as two standard size spaces. Parking spaces at roadside pull offs (both formal and social) were not included since these are not typically true destinations within the park, but rather “photo moments” for visitors. Parking capacity in the campground area also was not



included since the campground is not open to general visitor parking. In analyzing existing traffic volumes on park roadways, the VERP social indicator for the motorized sightseeing zone was referenced. The VERP indicator provides that traffic on the roadway will be monitored and will be considered out of standard if congestion is rated at a level of service of “C” or worse at any time. The Traffic Congestion Index set forth by the Transportation Research Board’s *Highway Capacity Manual* includes levels of service A through F, with A being the least congested condition and F being the most congested condition. Level of service C allows for a relatively stable flow and maneuverability closely controlled by higher volumes. Most drivers are restricted in their freedom to select their own speed, change lanes, or pass (VERP Implementation Plan 2005). Park roads typically do not exceed this standard and traffic volumes have been well within accepted operating standards prescribed by the federal government for rural roadways. As such, parking capacity was determined to be the best factor to determine the park’s transportation system capacity.

A theoretical parking capacity of 4,817 daily visitors total resulted from this analysis as depicted in the table.

The park’s GMP identified a possible short-coming of this analysis by stating “...the people who cannot find parking at the most popular destinations generally are not dispersing to sites with excess capacity. Thus, the theoretical maximum capacities are exaggerated...”

However even with this possible short-coming, the theoretical capacity is a reasonable basis and point of reference for understanding the transportation system/parking capacity of the park. The capacity analysis provides a basis for the proposed actions in the transportation implementation plan and for ongoing management of parking areas and features to maintain visitor experience and resource protection standards.

A typical “rule of thumb” in transportation planning states that parking areas and transportation facilities operate best on a continual basis when use levels stay within approximately 85 percent of the facility’s capacity (the 85th percentile rule). Referencing the theoretical parking capacity of 4,817 total daily visitors, it can be assumed that 4,094 visitors (85 percent of the total daily visitors) theoretically can be adequately accommodated by existing parking facilities within the park on a continual basis.

Applying the forecasted annual growth rates (shown in Table 3.1) as frame of reference, visitation levels likely will not exceed the 85th percentile theoretical capacity at peak periods annually within the six- year planning horizon of this transportation implementation plan (2006-2012) if growth rates stay within the forecasted range on average. Even a constant average annual growth rate of 5 percent in visitation would not reach the 85th percentile capacity level until 2024.

However, another point of reference cited by staff was the level of visitation experienced in 1999. Park staff noted challenges in managing the visitation levels during the peak periods of that year. Visitation counts indicate that an average of about 3,480 visitors per day visited Arches from April 1 through October 31 that year. As such, if this visitation level is reached on a more consistent basis in the future, it could be viewed as another threshold upon which more intensive transportation management strategies may be needed. If visitation increased by 3.11 percent on average annually, it would reach this level in 15 years.

This analysis has helped to determine appropriate strategies and actions for the near term transportation implementation plan horizon of six years. Park growth rates may vary from forecasted rates. Also, because some sites/features in the park are more popular, these areas likely will reach their individual capacity levels sooner and more frequently and consistently than the park overall.



Table 3.3 - Parking Capacity at Arches National Park Parking Areas

Arches National Park – Parking Capacity Table (Sites from South to North)							
Parking Area	Spaces			Total Spaces	Vehicle Occupancy	Turnover Rate	Capacity
	Standard	Oversized*	Accessible				
Visitor Center Parking Lot	104	15 x 2	4	138	2.4	3	994
Park Avenue Viewpoint	18	3 x 2	2	26	2.4	3	187
La Sal Mountains Viewpoint Parking Area	10			10	2.4	3	72
Courthouse Towers Viewpoint Parking Area	18	2 x 2		22	2.4	3	158
Tower of Babel Parking Area	2			2	2.4	3	43
Unsigned Courthouse Wash Parking Area	6			6	2.4	3	43
Petrified Dunes Viewpoint Parking Area	4			4	2.4	3	29
Balanced Rock Parking Area	13	3 x 2	1	20	2.4	3	144
Garden of Eden Parking Area	20			20	2.4	3	144
Double Arch Parking area	16	4 x 2	2	24	2.4	3	173
Windows Parking Area	27	4 x 2		35	2.4	3	252
Panorama Point Parking Area	20			20	2.4	3	144
Wolfe Ranch/Delicate Arch Trailhead parking Area	53	11 x 2	2	77	2.4	3	554
Delicate Arch Viewpoint Parking Area	26	17 x 2	3	63	2.4	3	454
Salt Valley Overlook Parking Area	8			8	2.4	3	58
Fiery Furnace Viewpoint Parking Area	17			17	2.4	3	122
Sand Dune Arch/Broken Arch Parking Area	13	3 x 2	1	20	2.4	3	144
Skyline Arch Trailhead Parking Area	7			7	2.4	3	50
Devils garden Picnic Parking Area	14		1	15	2.4	3	108
Devils Garden Parking Area	101	15 x 2	4	135	2.4	3	972
Totals	497	77 x 2	18	669	2.4	3	4817

*Note: Oversize spaces account for one RV or 2 vehicles. Lots are sized with the assumption that the RV spaces will be occupied by two vehicles.

overall, particularly during peak visitation periods (a likely scenario given the short-coming of the capacity analysis stated earlier). If this happens, some additional congestion management strategies, such as additional key feature management through permits systems or guided tours during peak periods (similar to the Fiery Furnace program), are proposed in the transportation implementation plan.

Visitor Travel Patterns and Parking Area Conditions

A more detailed analysis of travel patterns was completed related to the most popular attractions at Arches National Park, the Windows section, Balanced Rock, Devils Garden, Delicate Arch Viewpoint, the Visitor Center, and Wolfe Ranch/Delicate Arch Trailhead. 70 percent of all visitors go to the Windows, while 60 percent go to the Visitor Center, Balanced Rock, Delicate Arch viewpoint, and Devils Garden.

Over half of all visitors stay in the park for less than one day. The average length of stay at the park is about four to five hours. Of those visitors that do stay longer than one day, the majority spend no more than two days at the park. Average vehicle occupancy rates for visitor vehicles exiting the park were calculated in 2003 based on a statistically valid travel survey. The calculated average was 2.4 to 2.5 people per vehicle. Parking area capacities (shown in Table 3.3) were calculated based on the 2.4 average and an overall average turn- over rate of 3 times per day.

A study was conducted of the distribution of entering vehicles in 2003. Table 3.4 depicts the number of days that correlated to various quantities of entering vehicles. Based on a comparison of these numbers to parking turn-over rates and conditions at park feature parking areas, it appears that when the total number of vehicles entering the park in a day exceeds about 900 vehicles, congestion and crowding typically occur at three parking areas: Devils Garden, Windows/Double Arch, and Wolfe



Ranch/Delicate Arch Trailhead, at least during some hours of the day. There were 97 days in 2003 when more than 900 vehicles entered the park. Most of these 97 days occurred between mid- April and mid- October.

When visitation is higher (for example, when there are 1,100 or more vehicles entering the park), parking congestion and management problems become considerably more severe according to park staff. The general conclusion is that there is parking congestion in the three parking areas for about 100 days per year at the levels of visitation that existed in 2003. Any

future growth in visitation would exacerbate the parking congestion.

Although this analysis focused on parking conditions associated with three of the major park feature areas (because parking occupancy data was available for those areas), park staff report that additional parking areas experience congestion during peak visitation periods, and although analysis has not documented specific conditions at these areas, it will be important for transportation implementation plan strategies and actions to address the potential for congestion in all parking areas throughout the park.

Table 3.4 — Distribution of Entering Vehicles in 2003

Highest day - - 1394 entering vehicles	
Number of days with 1300 or more entering vehicles	2
Number of days with 1200 or more entering vehicles	5
Number of days with 1100 or more entering vehicles	18
Number of days with 1000 or more entering vehicles	44
Number of days with 900 or more entering vehicles	97
Number of days with 800 or more entering vehicles	137
Number of days with 700 or more entering vehicles	177
Number of days with 600 or more entering vehicles	197
Number of days with 500 or more entering vehicles	217
Number of days with 400 or more entering vehicles	226
Number of days with 300 or more entering vehicles	244
Number of days with 200 or more entering vehicles	273
Number of days with 100 or more entering vehicles	316



Summary of Existing Tour Services

Although there is no general sightseeing tour experience offered at Arches National Park presently, a few specialized tour services are currently available to visitors as described below. These tour services are tailored to specific clientele interested in a fully catered experience. The majority of current tours that include a visit to Arches National Park are focused on accessing and guiding visitors to remote areas of the park. Most private tours in the region focus on providing access to Canyonlands National Park and river rafting on the Colorado River.

The existing types of tour services offered are typically marketed in association with another type of activity, such as hiking, four- wheeling, and/or river rafting. Existing tours tend to be tailored and marketed more toward “adventure seekers” and less toward the general population. Currently, a general motorized interpretive/sightseeing tour of features within Arches National Park, provided at a more affordable price for a broader spectrum of the public, is not available.

The following tour providers are authorized through concession contracts issued by the National Park Service to guide tours into Arches National Park

Tag- A- Long Expeditions (www.tagalong.com)

Located in Moab, Utah, Tag- A- Long Expeditions offers river expeditions, land safaris, half- day, full- day, self guided, and custom trips down the Colorado River and into Canyonlands and Arches national parks. In 2001, Canyonlands National Park dedicated the Visitor Service Award to Tag- A- Long Expeditions for superior service to park visitors. A guided tour of Arches National Park is an option as part of a customized tour. Customized tours are typically priced at \$60.00 per person for half day and \$80.00 per person for full day.

O.A.R.S. (www.oars.com)

OARS is the largest river company in the west, running rivers in Idaho, Utah, California, Oregon, Wyoming, and the Grand Canyon. In Utah, OARS offers adventures in Cataract Canyon, the San Juan River, and the Canyonlands Backcountry including the Needles, the Maze and White Rim. In addition to white water rafting, OARS offers multi- sport trips and 4x4 tours. One- day 4x4 trips to both Canyonlands and Arches National Park are offered through OARS through the “multi- sport tour.” The typical price per person is \$19.95.

NAVTEC (www.navtec.com)

Based out of Moab, Utah, NAVTEC offers river trips, combination river and land trips, and 4x4 land trips. Trips range from one day to multi- day and explore Utah’s Canyonlands. NAVTEC offers one- day 4x4 land trips to areas in the Moab region, including Canyonlands National Park and provides backcountry guides as part of the experience. Trips involving Arches National Park are not currently offered by NAVTEC according to the information available on the website.

National Park Service Guided Tours of the Fiery Furnace

Arches National Park provides guided interpretive tours (on- foot; tour guides meet visitors at Fiery Furnace parking lot). Visitors are required to obtain reservations in advance for these tours. After heavy use threatened to impact the sensitive environment surrounding the Fiery Furnace, the park decided to manage access through guided tours by park staff and a limited number of daily permits.

Park staff report that the Fiery Furnace tour is very popular. Tours often book full two days or more in advance. The park leads two tours per day, one in the morning and one in the afternoon. Group size for the tours is limited to 25 people, and the park charges a nominal fee of \$10.00 per adults and \$5.00 per child.



Other Arches National Park Interpretive Tours

Arches National Park staff and volunteers provide one- hour interpretive walks each day at different locations throughout the park. The schedule for the walks varies. Visitors are encouraged to check with the Visitor Center or refer to the one of many park bulletin boards for the walk schedule. These interpretive walks are provided free of charge. The interpretive guide meets the visitors at the designated location for the walk (so visitors use their own vehicles to travel to the tour location.)

Existing Intelligent Transportation System (ITS) Applications at the Park

There are several ITS applications already in use or planned to be installed at Arches National Park. While some of these applications require enhancement to maximize their effectiveness, others are being used quite effectively already. The following is a summary of existing ITS applications that Arches National Park already uses:

- Self- guided audio tours,
- Informational, interactive kiosks in the new Visitor Center with stored information to assist regional trip planning,
- Visitor Center staff can assist visitors in obtaining weather and other related travel information,
- Digital Closed Circuit Television (CCTV) recording the entrance station,
- Campground reservations via the Internet and toll- free telephone,
- Arches National Park website,
- Automated fare collection system, used when the fee booths are closed, and
- Highway Advisory Radio (HAR) system updated five or six times a year.

Park Operations

Park staff members are assigned to the following divisions and areas: fee collection, interpretation, law enforcement and emergency assistance, facility management, resource protection, special park uses, management, and administration. The total number of permanent and seasonal staff fluctuates each year. In 2003, 40 staff members at Arches National Park completed employee surveys as part of this transportation plan project. Park staff members report that a considerable amount of time is spent each year on efforts related to managing traffic congestion in parking areas and at park attractions, assisting in visitor orientation, monitoring resource impacts as a result of social pull offs and social trail use, and patrolling traffic conditions along park roads.

The park operates with the assistance of many volunteers each year, who help with interpretive activities, resource management activities and campground host duties. The park's total volunteer commitment in FY 2004 was 10, 124 hours.

Staff continued to monitor VERP in FY 2004, conducting 2,100 VERP monitoring surveys, 700 each at the Windows, Delicate Arch and Devils Garden (pedestrian section). A total of 340 surveys were conducted in the motorized rural zone (Salt Valley Road) and 63 were conducted in the semi- primitive motorized zone (four- wheel drive road).

Arches National Park total ONPS Green Book funding for fiscal year (FY) 2004 was \$1,140,000 prior to IMR assessment and \$1,121,200 after assessments.

The Division of Interpretation conducted the following services and programs in 2004:

- Fiery Furnace walks
- Visitor Center programs
- Evening programs
- Guided walks
- Visitor contact on roving interpretation



- “Porch talks” outside the Visitor Center

In 2003, the Visitor Services Project conducted a survey of visitors. Most visitor groups (94 percent) rated the overall quality of visitor services at Arches National Park as “very good” or “good.” Visitor groups were asked, “If you were a manager planning for the future of Arches National Park, what would you propose?” Following were the most often stated responses:

Related to Personnel:

- More roving rangers to prevent damage
- More ranger guided tours

Related to Interpretive Services:

- Mark all trails with mileage and difficulty level
- More interpretive signs along the trails
- Advertise more about the park
- Park brochure and map in different languages
- An educational center further inside the park

Related to Facilities/Maintenance:

- Add drinking fountains
- More hiking trails
- Improve quality of maintenance
- Add food service/snack bar
- Better access for people with mobility problems
- More shaded areas
- More restrooms
- Keep it clean
- Better directional signs
- More trash cans
- More parking
- Add a primitive campground with water
- More paved roads/more roads
- More pullout overlook spaces

Ninety- eight percent of the respondents expressed an interest in learning new subjects. Preferred methods of learning mentioned included “hiking in the park” (65 percent), “reading illustrated brochures” (56 percent), and “driving through the park” (47 percent). “Taking a guided tour with ranger” was mentioned by 22 percent of the survey respondents. For additional survey results, refer to <http://www.psu.uidaho.edu>

These survey results could help to guide future planning and implementation activities and ongoing park management and operations (including those areas with a relationship to transportation facilities). There are several proposed elements of the transportation implementation plan, that if implemented would help to address the interests stated by visitors. Park staff members have been actively involved in the development of this plan.

Socioeconomics

Arches National Park is an international attraction that provides benefits to the regional economy.

Grand County (where Arches National Park is located) had a population of 8,826 in 2005. Population growth in the county has been variable over the last two and a half decades. According to the 2000 US Census information, population in the county grew 28.2 percent between 1990 and 2000 after a previous period of decline in the 1980s. Population growth between 2000 and 2005 slowed to less than one percent annually on average. In 2005, Moab’s population was 4,825, equaling 54.7 percent of the County’s total population.

In the 2005 civilian labor force there were 3,950 employed workers in Grand County out of the total labor force of 4,332, leaving 382 unemployed, equaling 8.8 percent unemployment, higher than the Utah state average of 4.2 percent and national average of 5.0 percent in 2005.

Tourism and recreation now form the basis of economic activity and growth in the regional



economy. Tourism/recreation related employment has grown by approximately 20 percent since 1995, accounting for more than 45 percent of Grand County's total employment in 2002. The City of Moab is the tourism/recreation activity hub of the region, acting as a gateway to Arches and Canyonlands national parks, as well as Dead Horse State Park and Bureau of Land Management recreational lands (Grand County General Plan Update, 2003). Due to the strong correlation between employment and the regional tourism/recreation industry, the county experiences seasonal fluctuations, and unemployment levels are typically higher during off-peak tourism periods (primarily during the winter).

Government, retail trade, and accommodation and food services are the primary economic sectors for the region. The accommodation and restaurant sectors each paid out around \$10 million in wages and salaries (personal income) in 2002.

Largest non-agricultural employers in the county in 2005 included Allen Memorial Hospital, Grand County, Grand County School District, National Park Service, Quinstar, the Bureau of Land Management, City Market, Inc., Moab Brewery, City of Moab, State of Utah, and Zax Wood Fired Pizza.

The average per capita income in Grand County in 2002 was \$20,678, below both the Utah state per capita income of \$24,306 and the national per capita income of \$30,906. Total personal income in Grand County in 2002 was \$180 million.

The Utah Department of Community and Economic Development reported total visitor spending in Grand County in 2002 at \$111.4 million, supporting 2,042 jobs and \$2.3 million in taxes, ranking Grand County 8th among all counties in the state. Total gross taxable room sales in the county were \$27.9 million in 2002.

Based on the results of the 2003 study entitled *Impacts of Visitor Spending on the Local Economy: Arches National Park*, Arches National Park hosted 757,781 recreation visits in 2003.

There were 205,600 trips made by parties to the area. The two largest visitor segments in terms of trips to the region were overnight visitors staying in hotels, motels, or B & Bs in the area (59 percent) and visitors on day trips (19 percent).

Arches National Park visitors spent an average of \$310 per party per trip in the local area, with trip expenditures ranging from \$445 per party per trip for the hotel segment at the high end to \$67 per party for day trips at the low end.

Total spending from park visitors in 2003 was \$63.7 million. Sectors that received the greatest direct benefit from park visitors were hotels (\$22.4 million), restaurants (\$12.8 million) and amusements (\$7.7 million). Arches National Park visitors spent \$63.7 million within a fifty-mile radius of the park in 2003. Arches National Park contributed 57 percent of all tourist spending in Grand County, including 80 percent of hotel room sales and 73 percent of tourism related employment in 2003.

Currently, various types of touring programs and services that access Arches National Park are offered to visitors. However, there are no general motorized interpretive tours being offered at Arches or in the vicinity.

2000 census data show significant increases in the number of housing units and the number of households in the region. In Grand County, the number of housing units increased by more than 35 percent above 1990 levels, and the number of households increased by 38 percent above 1990 levels. Temporary housing and accommodations in Moab are available for the large influx of tourist and recreational visitors in various forms, including motels and hotels (1,583 rooms); bed and breakfasts; apartment units; condominiums; and guest houses (278 rooms) and numerous campsites (Grand County General Plan Update 2003).

Construction workers in the area typically seek a variety of temporary housing types including motels and hotels, RV parks, trailer parks, and rental properties in the region. Vacancy rates for temporary housing in Moab tend to follow the



patterns of seasonal tourism. The availability of temporary units is greatest between November and mid- February typically.

Land Use

Arches National Park

Existing Land Use

There are a total of 76,359 acres within the legislative boundaries of Arches National Park. Of this total, 133 acres are managed by Grand County, Utah under a recreational use patent (USDI National Park Service 1996). Park land uses include pedestrian trails that lead to many of the park's natural features, extensive backcountry areas recommended for wilderness designation, developed areas consisting of paved roads and pullouts, overlooks, picnic areas, parking areas, and other facilities that support visitor touring at major park destinations (e.g., Windows, Delicate Arch, Sand Dune Arch, and Devils Garden), and major visitor and administrative facilities such as the park Visitor Center, headquarters, and Devils Garden campground and picnic area. The park is comprised of one of the greatest density of natural arches in the world.

Land Use Plans

The *Arches National Park General Management Plan* (GMP) (USDI National Park Service 1989) serves as a guide for management of land use development in the park. It identifies development and management actions that satisfy public need for recreation, while simultaneously protecting the park's natural and cultural resources. The plan established management objectives consistent with National Park Service policies and appropriate for the park's setting (excerpted from the *Arches National Park Statement for Management*, USDI NPS 1988b). While all the management objectives listed are important to consider as part of parkwide planning efforts, the following objectives in particular are relevant to the proposed transportation implementation plan:

- Minimize threats to the health and safety of visitors;

- Provide for visitor education and enjoyment through the interpretation of park resources, values, and primary themes; and
- Retain the lowest possible level of development to satisfy the needs of a wide diversity of interest.

For National Park Service management purposes, the GMP divides Arches National Park into four zones: natural, cultural, development, and special use. The "development zone" provides the necessary space for visitor and management facilities (71 acres) and roads (179.4 acres). According to the GMP, parking pullouts along the main park road would be redesigned as necessary for safety, requiring some widening and lengthening of existing pullouts and possibly eliminating others. Proposed parking areas and trails are identified on individual site development plans, and include plans to construct a new parking area at the Sand Dune Arch Trailhead.

The *Arches National Park Resource Management Plan* (USDI National Park Service 1996) is a strategic planning document focused on effective management and preservation of the park's natural and cultural resources. Specific management objectives include managing developed areas for intensive visitor use while providing for the maximum protection of the natural environment and restoring wherever possible the natural condition of parklands and plant communities altered by human activities.

The *Arches National Park Visitor Experience and Resource Protection (VERP) Implementation Plan* (USDI National Park Service 1995a) was developed with intent of safeguarding both the quality of visitor experiences and the resources at the park. The VERP program established park-wide management zones. Actions proposed in the transportation implementation plan would occur in the park's "motorized sightseeing zone." This zone is a substantially developed area consisting of paved roads, pullouts, overlooks, and associated short trails and small picnic areas, parking areas, and other facilities that support visitor touring. Intensive management is provided in the motorized



sightseeing zone to ensure resource protection and public safety. Proposed management actions to address increasing visitor use in the motorized sightseeing zone include closing off and reclaiming unapproved social pull offs along main roads and using barriers or road construction techniques to discourage social parking. Other management actions include prohibiting parking along main roads except at designated sites.

Bureau of Land Management

Existing Land Use

The BLM administers over 5 million acres near and/or contiguous to Arches National Park and provides the public numerous recreation opportunities. Those include camping, boating, picnicking, swimming, and hiking on BLM-administered land directly adjacent to Arches' southeast boundary along the Colorado River. To accommodate these uses, BLM maintains several developed recreation and picnic sites and campgrounds (USDI National Park Service 1995a).

Land Use Plans

The BLM is currently updating its Resource Management Plan, however the plan will not be publicly released until March 2006. The existing Resource Management Plan (RMP) is still being used to manage land in the Grand Resource Area. This RMP was created in 1985.

Grand County

Existing Land Use

Arches National Park is located in Grand County, Utah. Of the approximately 2.4 million acres in the County, 72 percent is managed by the federal government (66 percent by the BLM), 16 percent is managed by the state, 4 percent is owned by tribal governments, and 4 percent is privately owned (Grand County 2004). As of the 2000 US Census, the total population for Grand County was 8,485. Most of the county's private land, current development, and future projected growth is in Spanish Valley (which includes the City of Moab). Grand

County's land use and zoning authority does not directly apply to lands within the park (Grand County 1999). The park and surrounding BLM lands are identified in the Grand County General Plan Update as Public Land (Grand County 2004).

The unincorporated area between the park Visitor Center and the City of Moab is known as the *North Corridor Gateway*, and was the focus of a joint planning effort by Grand County and the City of Moab in 2001 (see Land Use Plans, below). In that area, the setting is predominantly rural with the exception of the Atlas tailings and mill site. The area south of the river is characterized by developing tourist uses and accommodations including motels and RV parks.

Land Use Plans

The *North Corridor Gateway Plan* was the result of a joint planning effort by Grand County and the City of Moab in 2001. The North Corridor Gateway is the area along US Highway 191 between the Arches National Park Visitor Center and Moab city limits that includes a) parcels or portions of parcels with highway frontage, b) lands within 500 feet of the highway, and c) the Atlas properties. The plan proposes two new land use categories for future development in the corridor: a) a Tourist Commercial (TC) category that would allow a variety of tourist-oriented commercial uses and b) a Specially Planned Area (SPA) to accommodate a variety of interim uses on the Atlas Mill and tailings sites over the next 15- 20 years as DOE remediation and reclamation of the sites proceeds.

City of Moab

Existing Land Use

The City of Moab is located approximately five miles south of Arches National Park and is the center of visitor services for the park. The City supports numerous tourism- and recreation-related businesses that dominate the city's central downtown.



These include motels and hotels, restaurants, campgrounds, interagency Moab Information Center, rental and shuttle services, mountain bike shops, river float companies, and air tour operators (USDI National Park Service 1995a). The 2000 US Census population of Moab was 4,479.

Land Use Plans

The *City of Moab General Plan* (City of Moab 2001) and Moab Zoning Code (Title 17 Moab City Code 2004) guide land use development in the city. The General Plan contains a number of goals and policies intended to protect the small town character of the city while promoting growth and economic development, including tourism.

Zoning for commercial uses is predominant along the entire US 191 corridor through the City of Moab. In particular, the Central Commercial (C3) and General Commercial (C4) zones allow a variety of commercial, business, and light industrial uses. The C3 zone focuses on the downtown and promotes it as the dominant shopping and financial center of the city. The C4 zone allows a variety of business and light industrial uses, and also has the stated goal to “facilitate the development of attractive entrances to the city.” The zone allows a full range of tourist-related uses, but also allows auto services and some other light manufacturing uses.



Introduction

This chapter describes the environmental consequences associated with the alternatives. The chapter is organized by impact topics, which distill the issues and concerns into distinct topics for analysis. These topics focus on the presentation of environmental consequences and allow a standardized comparison between alternatives based on the most relevant topics.

NEPA requires that environmental documents disclose the environmental impacts of the proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the action be implemented. This chapter analyzes the environmental impacts of the alternatives identified in Chapter 2 on the relevant impact topics defined in Chapter 1.

In accordance with National Park Service (NPS) and National Environmental Policy Act (NEPA) requirements, some environmental topics have been eliminated from detailed analysis because the expected adverse impacts would be negligible to minor with implementation of mitigation. Only topics selected to be carried forward through more detailed analysis are addressed in this chapter.

Methodology

NEPA requires examination of several factors in the analysis of potential environmental consequences of alternatives. The type, context, intensity and duration of impacts must be addressed for each element of the environment being analyzed, along with direct, indirect, and cumulative effects. NPS policy also requires that “impairment” of resources be evaluated in all environmental documents. For each impact topic, the discussion includes analysis of impacts of each alternative followed by an assessment of cumulative impacts, and a conclusion.

General Definitions

For each impact topic, impacts are defined in terms of type, context, intensity, and duration. Cumulative effects are also discussed. Definitions of intensity levels vary by impact topic. However, for all impact topics the following definitions are applied.

Types of Impacts

The effects that an alternative would have on an impact topic would be either adverse or beneficial. In some cases, an action would result in both adverse and beneficial effects for the same impact topic. For example, Alternative B would have an adverse effect by disturbing biological soil crusts at the new Sand Dune Arch Trailhead parking area, and a beneficial effect by discouraging further social pull off activity and protecting soil crusts from further disturbance.

Context

Context is the setting within which impacts are analyzed. Examples include the affected region, the society as a whole, affected interests, and/or a locality. In this plan, context is defined as local (within the footprints of construction areas or within a specific area of the park), park- wide (throughout the entire park), or regional (Moab, Arches National Park, and surrounding areas in Grand County, Utah).

Intensity

Impact intensity is the degree to which a resource would be beneficially or adversely affected (negligible, minor, moderate, and major). The criteria used to rate the intensity of the impacts for each resource topic are presented later in this chapter under each topic heading.

Duration

Duration is the time period for which impacts are evident (e.g., short- term and long- term). Impact



duration varies by resource topic and is analyzed for individual resources in this chapter. In general, a short- term effect is one that occurs within a short period of time (for the purposes of this document, not more than six years) and would no longer be detectable as the resource is returned to its pre- disturbance condition or appearance. A long- term effect is generally defined as a change in a resource or its condition that does not return to pre- disturbance condition or appearance and for all practical purposes is considered permanent.

Direct and Indirect Effects

Direct effects are impacts resulting from alternatives and occurring at the same time and place. Indirect effects are impacts resulting from the alternatives but occurring later in time or further removed in distance, but still reasonably foreseeable. For example, the creation of a new centralized operation and maintenance facility in Moab to support motorized interpretive tours would result in direct, short- term adverse impacts on visual quality during construction caused by use of large equipment working in construction areas; dust and fumes created by earth- moving activities; and temporary parking of contractor and staff vehicles. However, the proposed motorized interpretive tours likely would decrease the overall number of motor vehicles in the park, particularly during periods of peak visitation. Over the long term, this would reduce one of the most prevalent visual impacts currently affecting the park – vehicles that circulate in parking areas and park in undesignated areas – resulting in indirect beneficial effects on visual quality.

Cumulative Effects

The Council on Environmental Quality (CEQ) regulations and Director's Order- 12, which implement National Environmental Policy Act (NEPA), require assessment of cumulative effects in the decision- making process. Cumulative effects are defined as "the impact on the environment, which results from the incremental impact of the action when added to other past, present, or future foreseeable actions regardless of

what agency (federal or non- federal) or person undertakes such other actions" (40 CFR 1508.7).

Geographic Area for Cumulative Impacts

The geographic area for the cumulative impact analysis of alternatives includes Arches National Park, adjacent BLM lands, and adjacent lands in Grand County. In addition, City of Moab and Grand County plans and policies that have the potential to impact resources affected by alternatives are also considered.

Past, Present, and Future Actions

Cumulative impacts are determined by combining the impacts of each alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions within Arches National Park and, if applicable, the surrounding region. These actions are summarized below.

Arches National Park

Specific past, ongoing, and reasonably foreseeable future projects at Arches National Park considered in this environmental analysis include the following:

- **Delicate Arch Road Corridor Project:** The three- mile spur road from the main park road to the Wolfe Ranch/Delicate Arch Trailhead and Delicate Arch Viewpoint was redesigned and paved in 1993. At the same time, the parking lots at the Delicate Arch Trailhead and Delicate Arch Viewpoint were expanded and paved.
- **Visitor Center and Park Entry Road Realignment Project:** This project involved construction of a new 14,855- square- foot Visitor Center adjacent to the previous 4,618 square foot Visitor Center, which was remodeled to hold administrative offices and storage. A new 74,596 square- foot parking lot with a capacity for over 140 vehicles (including 15 recreational vehicle stalls) was constructed adjacent to the new building. As part of the new Visitor Center project, approximately one- half



mile of the park entry road was realigned to increase safety for vehicles entering and exiting the park and to provide adequate queuing room for vehicles at the fee collection booth. The new Visitor Center was dedicated in September 2005.

In addition to these past and planned construction projects, Arches National Park has a number of smaller projects planned or underway that involve either minor physical disturbance or implementation of programs and activities. These actions include the following:

Actions Proceeding

- **Chip Seal Surfacing of Park Roads:** This action involves resurfacing and restriping the following existing roads: The main park road from the Delicate Arch road to Devils Garden, the Salt Valley Overlook road, and the Fiery Furnace road. If funding allows, the main road from Panorama Point to the Delicate Arch road and the Panorama Point road would be added. The work period would be 50 days or less. Traffic would be restricted to one lane for up to two miles at a time, with traffic delays limited to 15 minutes or less.
- **Rehabilitate/Upgrade Devils Garden Photovoltaic System:** This action involves installing a series of independent photovoltaic power systems for various existing power uses in the Devils Garden area: three comfort stations, the campground amphitheater, one campground host campsite, the generator building, and water well pump and supply system. The existing Devils Garden ranger office/residence would be remodeled for use as a campground host residence. Solar panels, freestanding or mounted on existing buildings, would be located at or near most of these sites. Comfort stations would be modified to safely provide for battery storage. Some trenches for underground water or power lines would be excavated, some of which would be within existing roadways or disturbed areas.
- **Trail Rehabilitation:** This action involves repair/reconstruction of sections of the following existing trails: Tunnel Arch, Devils

Garden Amphitheater and Trails, Delicate Arch Viewpoint, Double Arch, Balanced Rock, Fiery Furnace Viewpoint, Sand Dune Arch, and Turret Arch, totaling approximately 29,200 linear feet of trail rehabilitation.

- **Replace Fences at Trailheads and Parking Lots:** This action involves replacing existing fences at Balanced Rock, Windows, Delicate Arch Trailhead and Delicate Arch Viewpoint, Fiery Furnace, Sand Dune Arch/Broken Arch, Skyline Arch, and Devils Garden parking lots.
- **Fire and Fuels Management Plan:** NPS has developed a fire and fuels management plan for the four parks located within the Southeast Utah Group, including Arches National Park. The plan implements fire management policies and contributes toward resource management and fire management goals. The plan includes a variety of techniques to minimize the impacts of fire suppression. These include confinement strategies employing existing fuel breaks when available, restrictions on the use of heavy equipment and retardant, involvement of archaeologists in locating fire lines to avoid cultural resources, and protection of native riparian and grassland vegetation.
- **Commercial Use Authorization, Commercial Canyoneering Guided Tours:** The requested Incidental Business Permit (IBP) would permit a commercial tour company to continue to offer guided canyoneering trips in the Fiery Furnace, Lost Spring Canyon, Petrified Dunes, and the Rough and Rocky Mesa/Park Avenue areas of the park. These areas are not accessible by developed trails. Visitors would need to step carefully to avoid disturbing cryptobiotic soil crust and sensitive plants. The number of trips permitted per year would not be limited under this IBP. In recent years this tour company has conducted 50- 110 trips per year in the park, with group sizes averaging less than 5 people per group.

Actions Being Formulated or Under Environmental Review

- **Vegetation Management Plan, Southeast Utah Group:** This plan is under development, and



would focus on removal of exotic vegetation park- wide, but may also address active or passive restoration of native plant communities. Riparian areas, where tamarisk and other exotics have invaded, would be an area of emphasis. Large shrubs would be cut down, herbicide would be applied to stumps, young seedlings and sprouts, and slash would be piled and burned, broadcast, or removed from treatment sites.

Adjacent Bureau of Land Management Lands

The Bureau of Land Management (BLM) is currently updating its Resource Management Plan. However the plan will not be publicly released until March 2006.

The existing Resource Management Plan (RMP) for the Grand Resource Area (now known as the Moab Field Office) was created in 1985. The Grand Resource Area includes approximately 1,819,885 acres of land in Grand County and the northern third of San Juan County. During the process of developing this Transportation Implementation Plan and Environmental Assessment, the BLM provided up- to- date information related to resource management objectives in the area. The following are the existing resource management actions that apply to land surrounding Arches National Park.

- **Critical Watersheds:** install in- stream drop structures in eight streams (about 3,500 acres, eight allotments) to decrease sedimentation and improve water quality.
- **Livestock Requirements:** Livestock grazing is permitted over much of the Moab Field Office area. Areas around Arches National Park are reserved forage for wildlife.
- **Some BLM land surrounding Arches National Park** is open to off- road vehicle use. Vehicle use is limited to existing roads and trails in a few areas, including the Colorado and Green river corridors, Deadhorse Point State Park, and Canyon Rims Recreation Area.
- The BLM has designated 16,000 acres of land for utility corridors. A portion of a utility

corridor is located near the southwest boundary of Arches National Park.

- Much of the Moab Field Office area is open for mining claims. Mining and exploration is allowed in the Potash region of BLM land, adjacent to the northern and southwestern boundaries of Arches National Park. There are three sand and gravel areas near the boundary of Arches National Park. The majority of land surrounding the park is open for mineral leasing. Eleven Wilderness Study Areas (WSAs), totaling about 350,000 acres, are withdrawn from new mining claims and mineral leasing, while the Green, Colorado and Dolores River canyons are withdrawn from new mining claims.
- Lands surrounding Arches National Park are being used and managed for recreation, including off- road vehicles, mountain biking, hiking and camping.
- The Moab Field Office area includes eleven Wilderness Study Areas, totaling about 350,000 acres. Four of these WSAs are near Arches: Lost Spring, Negro Bill Canyon, Mill Creek, and Behind the Rocks. The WSAs are generally closed to vehicle use.

No immediate improvements on BLM lands are proposed except at the Negro Bill Canyon parking lot (see State of Utah Projects below). The BLM has confirmed their interest in working in partnership with the National Park Service to manage regional visitation patterns.

Other Federal Actions

Atlas Mine Tailings Site

The US Department of Energy (DOE) is proposing to clean up surface contamination and to develop and implement a groundwater compliance strategy to address contamination that resulted from historical uranium- ore processing at the Atlas Mill and tailings site. The tailings site is located in Grand County on the southeast side of the junction of highways 191 and 279, less than one mile from the Arches National Park entrance and Visitor Center. Contaminated material will be relocated to a disposal site to be constructed at



Crescent Junction, away from the park and the town of Moab. The DOE analyzed the potential environmental impacts of both on- site and off-site remediation and disposal alternatives involving both surface and groundwater contamination in an environmental impact statement (DOE/EIS- 0355, Final EIS published in 2005 and record of decision signed in September 2005). The contaminated materials will be transported to Crescent Junction via an existing railroad line.

State of Utah Projects

Specific nearby projects undertaken by the State of Utah and considered in this environmental analysis include the following:

Highway 191 Improvements

The Utah Department of Transportation (UDOT) completed widening of a five- mile stretch of US Highway 191 to four lanes between Potash Road and County Road 313 in the spring of 2005 (UDOT 2005). Long- term plans involve widening the entire 34- mile section of US 191 from Moab to Interstate 70. Recently completed highway improvements also included the addition of a paved shared use path (for bicycle and pedestrian use) adjacent to US 191 from the Courthouse Wash Bridge on 191 to a location approximately one mile beyond the park.

Colorado River Bridge Study

UDOT recently conducted an analysis of the US 191 crossing of the Colorado River, immediately south of the park. Although the bridge is structurally reliable, the purpose of the study was to help UDOT determine if it needs to be widened, replaced, or rehabilitated. The study proposes a four- lane replacement bridge. Preliminary design and an environmental assessment began in the spring of 2005 (UDOT 2005).

Pedestrian/Bicycle Bridge over the Colorado River

This project involving design and construction of a bicycle/pedestrian bridge over the Colorado River at Lions Park, north of the City of Moab, is

currently underway. Design began in spring 2005, and construction is anticipated to begin in 2006. Another section of shared use path eventually would be constructed from the Colorado Bridge to Moab along US 191, creating a pathway for bicyclists and pedestrians that extends all the way from Moab to Arches National Park.

Pedestrian/Bicycle Path near State Route 128

UDOT plans to construct a bicycle/pedestrian path from Lions Park to Negro Bill Canyon in the State Route 128 corridor. The project was in the design phase as of spring 2005 and construction is anticipated to begin in 2006.

State Route 128 at Negro Bill Canyon

UDOT plans to lower a hill on State Route 128 to improve sight distance at the Negro Bill Canyon turn- off. This project also includes excavating and paving a parking lot at the Negro Bill Canyon entrance. Project construction is anticipated to be completed in 2006.

Moab Main Street

UDOT is also preparing plans to rebuild and improve US 191, the main street through Downtown Moab, by replacing aging pavement with new, low- maintenance pavement and improving the road grade. All work would be conducted within the existing roadway. Construction is planned to start in winter 2005/2006.

County/City Actions

North Corridor Gateway Plan

The North Corridor Gateway is the area along US Highway 191 between the Arches National Park Visitor Center and Moab city limits that includes parcels or portions of parcels with highway frontage, on lands within 500 feet of the highway, and the Atlas Mill and tailings properties. The North Corridor Gateway was the focus of a joint planning effort by Grand County and the City of Moab in 2001. The plan proposes two new land use categories for future development in the corridor: 1) a Tourist Commercial (TC) category that would allow a variety of tourist- oriented commercial uses, and 2) a Specially Planned Area



(SPA) to accommodate a variety of interim uses on the Atlas Mill and tailings sites over the next 15- 20 years as Department of Energy remediation and reclamation of the sites proceeds.

The County also has plans to redevelop Lions Park. This park is connected to Arches National Park via a new shared use path adjacent to US 191.

Impairment of Park Resources or Values

In addition to determining the environmental consequences of the preferred action and other alternatives, National Park Service *Management Policies* (USDI National Park Service 2001b) and Director's Order 12 require analysis of potential effects to determine whether or not actions would impair park resources. Impairment is defined as an impact that, in the judgment of the National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource of value may constitute impairment. Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, provided the impact does not constitute impairment of the affected resources and values. Although Congress gave managers the discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a

particular law directly and specifically provides otherwise.

An impact would be more likely to constitute impairment if it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

This Environmental Assessment analyzes potential effects of the alternatives presented to determine if the alternatives would result in an impairment of park resources. Adverse impacts determined to have moderate or below (i.e., no impact, negligible, minor) intensities are not analyzed further relative to the impairment standard because of their relatively low magnitude. A finding regarding impairment appears in the concluding section for all impact topics except Visitor Use, Experience and Recreation Resources, Park Operations, and Socioeconomics because these topics are not resource- based

Analysis of Effects

Soils and Biological Soil Crusts

Methodology

The analysis below addresses potential impacts on two distinct but related resources: soils and biological soil crusts. While soil is the loose surface material of the earth created through erosion of rock by wind and water, biological soil crusts are a thin and fragile veneer of living organisms on top of the soil that may contain lichens, mosses, microfungi, bacteria, and green algae. In many areas of Arches National Park they comprise a large portion of the living ground cover that reduces erosion, increases water retention, and increases soil fertility.



Soils and biological soils crusts are addressed together in this section because the actions that can damage them are the same, though the thresholds for damage and the time required for recovery are quite different for each resource. Those actions include human foot traffic, livestock, vehicle tires, grading and construction, and (ultimately) total coverage or removal by buildings, roads or other structures.

Soils

Information on soils was derived primarily from the *Arches General Management Plan/Development Concept Plan and EA* (USDI National Park Service 1989), *Arches Resource Management Plan* (USDI National Park Service 1996), and *Arches Visitor Center and Park Entry Road Realignment EA* (USDI National Park Service 2002). Predictions about short- and long- term site impacts were based on previous projects with similar soil conditions, and other recent studies.

The thresholds of intensity for impacts on soils are defined as follows:

Negligible: The effects on soils would be below or at the lower levels of detection. Any effects on soils would be slight and no long- term effects on soils would occur.

Minor: The effects on soils would be detectable. Effects on soil area would be small. Mitigation may be needed to offset adverse effects and would be relatively simple to implement and likely be successful.

Moderate: The effect on soil would be readily apparent and would result in a change to the soil character over a relatively wide area. Mitigation measures would be necessary to offset adverse effects and likely be successful.

Major: The effect on soil would be readily apparent and would substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

The duration of impacts on soils are defined as follows:

Short- term: recovers in less than 3 years.

Long- term: takes more than 3 years to recover.

Biological Soil Crusts

Information on biological soil crust was obtained primarily from the *Visitor Experience and Resource Protection (VERP) Implementation Plan*, Arches National Park (USDI National Park Service 1995a), the US Department of the Interior Soil Crust website (www.soilcrust.org), and *Biological Soil Crusts: Ecology and Management* (Belnap et. al. 2001).

The impact intensity thresholds for biological soil crusts are defined as follows:

Negligible: The biological crust is disturbed or improved, but the change is not readily visible. Existing vegetation is not damaged or threatened. Any effects on soil crust productivity or stability would be slight.

Minor: The biological crust is visibly disturbed or improved, but not enough to affect existing vegetation or the success of rehabilitation efforts. Effects to soil crust productivity or stability would be small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.

Moderate: The biological crust and portions of surrounding vegetation are destroyed or restored within a small area or damaged or enhanced within a larger area. Effects to soil crust productivity or stability would be readily apparent, and would result in a change to soil crust character. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major: The biological crust is destroyed, highly disturbed, or restored over a large contiguous area or in numerous areas. Effects to soil crust productivity or stability would be readily apparent and would substantially change soil crust character. Mitigation measures to offset adverse effects would be needed, they would be extensive, and their success would not be guaranteed.



The duration of impacts on biological soil crusts is defined as follows:

Short- term: recovers in less than 5 years.

Long- term: takes more than 5 years to recover.

Environmental Consequences

Alternative A – No Action

Soils

Impact Analysis Under Alternative A the park would continue managing existing transportation facilities in their current condition, with minimal improvements to roads and parking areas on a case- by- case basis. For example, the shoulders of park roads would continue to be repaired and widened in some areas as part of annual maintenance projects. Minor improvements to roadway and parking areas may also continue to occur as part of periodic maintenance projects.

Continued road and parking area maintenance may result in a small loss of soils if repairs or widening occur adjacent to the existing roadbed or parking area. Under Alternative A there would also be continued use at more than 200 social pull offs located throughout the park. These activities would result in long- term soil compaction and associated loss of productivity along roadways and at the developed activity areas. Compaction would also continue as a result of vehicles parking on the road shoulder.

Under Alternative A, continuation of current efforts related to traffic calming improvements, motorized tour programs, ITS applications, the park's long- term partnerships with regional interests, ongoing VERP monitoring, and visitation and congestion management activities would have no affect on soils because these programs and activities would take place on existing disturbed ground and would result in no net new soil disturbance in the park.

Short- term impacts to soil resources from maintenance activities and continued use of social pull offs would be localized, minor, and adverse. Continued long- term adverse impacts on soil resources would be negligible to minor since impacts would be limited to relatively small and

often previously disturbed areas. Furthermore, measures to mitigate impacts contained in the General Management Plan and Environmental Assessment (National Park Service 1989) such as best management practices that call for reclamation of disturbed areas would successfully offset adverse long- term effects on soils.

Cumulative Impacts Soils in the park are impacted by past, present, and reasonably foreseeable actions implemented under the current General Management Plan, including the paving of Delicate Arch Road and construction of a new Visitor Center and park entry road. In implementing these types of actions, soils are excavated and replaced, buried beneath concrete, and eroded, resulting in localized and adverse impacts to soils. However, these activities have occurred in areas where human activities are already concentrated, resulting in minor impacts to soils in previously undisturbed areas. In addition, application of measures in the General Management Plan and VERP Implementation Plan to preserve the park's natural resources, have further minimized impacts on soils.

There are also several ongoing and planned projects in the park vicinity, including UDOT and City projects that could adversely affect soils. For example, construction of new pavement and trails along portions of U.S. 191 and State Route 128 would disturb soil resources over a relatively wide area, thereby contributing to cumulative soils impacts in the surrounding region.

Overall, impacts described under Alternative A, combined with impacts of other past, present, and reasonably foreseeable future actions both within and in the immediate vicinity of the park, would have short- and long- term, negligible to minor, adverse cumulative impacts on soils.

Implementation of Alternative A would contribute to cumulative impacts on soil resources. However, the contribution would be negligible because impacts would not affect a wide area of the park and land bordering areas of disturbance would be protected and managed to return to a more natural condition. Therefore, overall, short- and long- term, cumulative impacts would be negligible to minor and adverse.



Conclusions Continued soil disturbance and compaction associated with road and parking area maintenance and social pull off activity under Alternative A would result in short- term, localized minor adverse impacts and long- term negligible to minor adverse impacts on soil resources in the park. The long- term impacts are considered negligible to minor because detectable effects on soil resources would only occur in small, often previously disturbed areas and could be successfully mitigated by reclaiming disturbed areas through protection, raking, and contouring.

The cumulative effects of Alternative A in combination with past, present, and reasonably foreseeable future actions would have short- and long- term, negligible to minor, adverse impacts on soils. Alternative A would contribute a negligible amount to overall cumulative impacts. Therefore, overall, short- and long- term, cumulative impacts would be negligible to minor and adverse.

There would be no impairment of the park resources or values related to soils.

Biological Soil Crust

Impact Analysis Under Alternative A, the park would continue to manage existing transportation facilities in their current condition, with some minimal improvements as a result of ongoing maintenance and operations activities on a case-by- case basis (i.e. roadway and shoulder repairs, pavement patching, etc.). These current and ongoing maintenance and operations programs and activities would take place on existing disturbed ground and would not result in net new disturbances to biological soil crusts in the park. In accordance with the park's resource management objectives, current and ongoing maintenance and operations programs and activities would avoid new disturbance of soil crusts in the park to the maximum extent possible.

Over time, the creation of more than 200 social pull offs located throughout the park, as well as social pull off activity near parking areas, has resulted in disturbance of biological soil crusts throughout Arches National Park. Disturbance has occurred in the pull off and parking areas, as

well as adjacent to these areas, with the creation of social trails as a result of pedestrian activities. Continued social pull off, parking, and pedestrian activity may result in some additional disturbance and compaction of sensitive biological soil crust in these areas and new areas.

Short- term impacts to biological soil crusts from continued social pull off, parking, and pedestrian activities would be localized, minor to moderate, and adverse. Continued long- term adverse impacts on soil crust resources would be minor to moderate and adverse, with impacts generally limited to relatively small and often previously disturbed areas along roadside shoulders, social pull offs, and parking areas throughout the park.

Cumulative Impacts A number of past and present actions implemented under the park's 1989 General Management Plan (GMP), including the paving of Delicate Arch Road and construction of the new Visitor Center and park entry road, have disturbed areas of sensitive soil crusts. Ongoing and planned projects in the park vicinity would also adversely affect biological soil crusts.

Impacts described under Alternative A, combined with impacts of other past, present, and reasonably foreseeable future actions both within the park and in the park vicinity, would have short- and long- term, minor to moderate, adverse cumulative impacts on biological soil crusts. Implementation of Alternative A would continue to affect the park's soil crust resources, contributing at minor to moderate levels to short- and long- term cumulative impacts.

Conclusions Under the No Action Alternative, there would be minor to moderate, short- and long- term adverse impacts on biological soil crusts, primarily as a result of existing and ongoing social pull off, parking, and pedestrian activities. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse. There would be no impairment of park resources or values related to biological soil crusts.



Alternative B – Preferred Alternative

Soils

Impact Analysis

During construction of the formalized roadside pull offs, approximately 11,900 square feet would be newly disturbed. Within the newly disturbed areas there would be increased potential for soil erosion that is typically aggravated by removing vegetation, altering topography, and uncontrolled storm water runoff. Minor short- term adverse effects would occur where soils are disturbed during construction. Once construction is complete, the potential for erosion would be minimal because soils exposed during construction would be covered. Some existing disturbed areas in the vicinity of these locations (approximately 10,025 square feet) would be environmentally rehabilitated through protection, raking, contouring, and other means.

Under Alternative B, more than 170 other existing social pull offs in the park totaling approximately 191,664 square feet (4.4 acres) would be environmentally rehabilitated through protection, raking and contouring to aid the natural recovery process. Additionally, 13,600 square feet of existing paved and social parking areas would be removed and the landscape rehabilitated at parking areas (6,200 square feet at Devils Garden, 5,250 square feet at Sand Dune Arch, and 2,150 square feet at the Windows/Double Arch). No biological soil crusts have been identified within these disturbed social pull offs. With protection and rehabilitation some soil crusts may establish in or near these locations over time.

Existing social pull off locations in the park would be removed and treated using a combination of techniques to deter usage and to aid in natural recovery, such as edging areas with large boulders, signing, and in some cases erecting barriers such as fencing. The length of time required for re-establishment of natural vegetation after construction would vary depending on site-specific conditions, but could take several seasons of growth. The intent would be to protect areas so that they may recover over time on their own. These measures would result in less social pull off

activity throughout the park and protect soils from further disturbance. This would be a long-term beneficial effect.

Mitigation measures designed for the project would help to minimize soil excavation, erosion, and off- site soil migration during and after construction. For example, ground disturbance and site management would be carefully controlled to prevent undue damage to soils and to minimize soil degradation. Effective stormwater management measures specific to each construction site would be implemented and appropriate erosion and sediment control measures would be in place at all times.

Implementation of Alternative B would also disturb approximately 12,650 square feet for construction of a new parking area at the Sand Dune Arch Trailhead. During construction there would be increased potential for soil erosion caused by clearing, grading, and uncontrolled stormwater runoff. Once construction is complete, the potential for erosion would be minimal because soils exposed during construction would be covered. Approximately 13,600 square feet of existing paved and social parking areas would be rehabilitated through removal of existing pavement, raking, contouring, and other means at The Windows/Double Arch, Sand Dune Arch Trailhead, and Devils Garden parking areas, resulting in a long- term beneficial effect.

Construction of a new centralized operation and maintenance facility in Moab to support motorized interpretive tours could result in impacts on soils. Although the type and magnitude of impacts on soils would depend on the specific site location, impacts are expected to be short-term and adverse and range from negligible to minor if construction is in compliance with City grading regulations and occurs in the developed urbanized area.

Traffic calming measures could include advance-warning signs, pavement texturing, pavement coloring or markers, rumble strips and other techniques for slowing traffic. The long- term effect of these measures on soils would be negligible because all construction activities



would occur in previously disturbed areas along existing roadways.

ITS recommendations would help to monitor and manage traffic flow and reduce congestion at the park's key visitor destinations. These actions would have negligible impacts on soils because the components of the ITS system would occupy small footprints in already disturbed areas along roadways.

Other recommended actions include continued partnerships with local and regional interests, expanded visitor recreation and interpretation opportunities, ongoing VERP monitoring, and implementing various visitation and congestion management strategies, including development of a new picnic area at the Delicate Arch Viewpoint parking lot to disperse visitation. Most of these actions would not result in any physical improvements or changes to the park, other than potential changes in visitation patterns. Any improvements associated with these recommendations (such as picnic tables) would be installed in developed areas. Therefore, any long-term adverse effects of these actions on soils would be negligible. These measures may also have a beneficial effect to soils by dispersing visitation to additional formal destinations within the park, thereby relieving the pressure to create social pull offs and minimizing the potential for further soil disturbance.

Short-term impacts to soil resources from implementation of Alternative B would be localized, negligible to minor, and adverse. Long-term adverse impacts on soil resources would be negligible since proposed improvements would either be installed in previously disturbed areas and would not result in net new soil disturbance or would be offset by proposed restoration measures. Restoration of previously paved and compacted social parking areas at The Windows, Sand Dune Arch Trailhead, and Devils Garden parking lots and reclamation of existing social pull offs would have a long-term beneficial effect by helping to reduce soil runoff and erosion in these areas.

Cumulative Impacts Past, present, and reasonably foreseeable projects within and in the

vicinity of Arches National Park that would adversely impact soils under Alternative A would also apply to Alternative B. Past cumulative impacts on soil resources in the park include alteration and removal of soils along the park's existing roads and at destination areas such as the Visitor's Center. Past, present, and reasonably foreseeable actions in the immediate vicinity of Arches National Park would continue to disrupt soil resources in the surrounding region.

Overall, impacts described under Alternative B, combined with impacts of other past, present, and reasonably foreseeable future actions both within and in the immediate vicinity of the park, would have short- and long-term, negligible to minor, adverse cumulative impacts on soils. Implementation of Alternative B would contribute to cumulative impacts on soil resources. However, the contribution would be negligible because improvements would either be installed in previously disturbed areas and therefore would not result in net new soil disturbance or would be offset by proposed restoration measures. Overall, short- and long-term, cumulative impacts would be negligible to minor and adverse.

Conclusions Implementation of Alternative B would result in negligible to minor, localized, short- and long-term, adverse effects on soil resources. Also, the long-term beneficial effects resulting from the rehabilitation of over 170 existing social pull offs and removing pavement at existing parking lots and protecting and rehabilitating these areas would offset these adverse impacts.

Impacts described under Alternative B, combined with impacts of other past, present, and reasonably foreseeable future actions both within and in the immediate vicinity of the park, would have short- and long-term, negligible to minor, adverse cumulative impacts on soil resources. Alternative B would contribute a negligible amount to overall cumulative impacts. Therefore, overall, short- and long-term, cumulative impacts would be negligible to minor and adverse.

There would be no impairment of the park resources or values related to soils.



Biological Soil Crusts

Impact Analysis Alternative B would result in the permanent conversion of approximately 12,650 square feet of land for construction of a new parking area at the Sand Dune Arch Trailhead. The presence of biological soil crusts at this proposed site has been confirmed, although site surveys have not been conducted to determine the exact surface coverage of the crusts. Review of aerial photos in relation to the conceptual site plan, indicates that biological soil crust would be destroyed within a small, localized area. Some areas affected during construction likely would naturally recover within five years, but other areas would not. Therefore, the impact would be considered short- term and long- term, moderate, and adverse.

Final design of the new parking area and trail connection would include configuration of improvements to avoid biological soil crusts present in the vicinity to the maximum extent possible.

Measures to mitigate the loss of soil crusts at the Sand Dune Arch site would be finalized during the final design process and would involve extensive collaboration with NPS biologists and resource specialists. Mitigation measures may include, but would not be limited to rehabilitation of a partially- disturbed soil crust area in another part of the park to compensate for the on- site loss, using crust “mined” (excavated and removed) from the development site area.

Other impacts associated with Alternative B would create new disturbance of approximately 11,900 square feet to pave and formalize 21 pull offs currently being used as social pull offs. This square footage of new disturbance area includes small, isolated areas located directly adjacent to previously disturbed areas in several locations (not all 21). Formalizing these pull offs would focus on existing developed areas to the greatest extent possible. Some existing disturbed areas in the vicinity of these locations (approximately 10,025 square feet) would be environmentally rehabilitated through protection, raking and contouring, and other means. No biological soil crusts have been identified within the 11,900

square feet that would be newly disturbed during improvements to the pull offs. Formalizing these pull off locations likely would not affect biological soil crusts in some areas, but may result in short-term, negligible adverse effects in areas where pedestrian activity may occur adjacent to the pull off. Mitigation would include ongoing education of visitors about the potential damage of foot traffic to biological soil crusts.

Under Alternative B, more than 170 other existing social pull offs in the park totaling approximately 191,664 square feet (4.4 acres) would be environmentally rehabilitated through protection, raking and contouring to aid the natural recovery process. Additionally, 13,600 square feet of existing paved and social parking areas would be removed and the landscape rehabilitated at parking areas (6,200 square feet at Devils Garden, 5,250 square feet at Sand Dune Arch, and 2,150 square feet at the Windows/Double Arch). No biological soil crusts have been identified within these disturbed social pull offs or within the sections of paved parking areas to be removed. With protection and rehabilitation some soil crusts may establish in or near these locations over time.

Treatment techniques in addition to replanting with native vegetation, would include edging areas with large boulders and in some cases erecting barriers such as fencing. Additional treatments, such as soil crust transplanting or the application of soil amendments, might also be implemented in some locations where appropriate under the direction of resource specialists. These measures would result in a long- term benefit to biological soil crusts by discouraging further social pull off and parking activity throughout the park, protecting soil crusts from further disturbance, and aiding the natural recovery process.

Traffic calming measures would include advance-warning signs, pavement texturing, pavement coloring or markers, rumble strips and other techniques for slowing traffic. In some areas, these improvements would not likely effect biological soil crusts since construction activity would be limited to previously disturbed areas along and within existing roadways. However, short- term, negligible adverse impacts may occur in some



areas where traffic calming improvements coincide with pedestrian crossings. Pedestrian social trails could appear in these areas. This potential activity could be mitigated by ongoing visitor education related to the damage of foot traffic on sensitive biological soil crusts. Installation of new signs would specifically avoid areas where there are established soil crusts.

If a new centralized operation and maintenance facility in Moab were constructed to support motorized interpretive tours, this could result in adverse impacts on biological soil crusts if present. However, the site location in the Moab vicinity, and therefore the location of soil crusts, if any, is not known at this time. The intensity and duration of impacts on soil crusts would depend on the specific site location, whether a new facility were to be constructed, and if so whether the site is currently developed or undeveloped. It is likely that the operations facility would be either newly constructed or retrofitted within an already existing disturbed and developed site in Moab. Given that Moab is a developed urbanized area, the presence of biological soil crust is less likely than in natural areas, such as at the park. Locating the operation and maintenance facility in Moab would avoid adverse effects on biological soil crusts inside the park by precluding development of a new facility in potentially sensitive areas, and by reducing the number of private vehicles entering the park overall.

Proposed Intelligent Transportation System (ITS) actions would help to monitor and manage traffic flow and reduce congestion at the park's visitor destinations. These actions would not likely affect biological soil crusts because proposed improvements would not involve construction of new facilities. New components of the ITS system would be housed in existing facilities in already developed areas of the park.

Other proposed actions include continued partnerships with local and regional interests, expanded visitor recreation and interpretation opportunities, ongoing VERP monitoring, and other various visitation and congestion management strategies. Any improvements associated with these proposed actions (such as picnic tables and temporary, seasonal shade

structures) would be installed in already developed parking areas. Restriping and minor construction activities would be limited to already paved and disturbed areas. Although construction activities would not affect biological soil crusts in these areas, creation of a new picnicking area at Delicate Arch Viewpoint could result in short-term, negligible adverse effects if pedestrian activity occurs in nearby natural areas. Mitigation would include ongoing education of visitors about the potential damage of foot traffic to biological soil crusts.

Protection and rehabilitation of roadside areas and congestion management strategies, including ITS applications, also would result in beneficial effects on biological soil crusts by dispersing visitation to other developed destinations within the park and relieving the pressure of visitor use on sensitive soil crust areas, such as at the Windows, aiding the natural recovery of soil crusts in these affected areas.

Cumulative Impacts Past, present, and reasonably foreseeable projects within and in the vicinity of Arches National Park with adverse effects to biological soil crust under Alternative A would also apply to Alternative B. Past and present actions in Arches National Park have contributed to the gradual alteration of biological soil crusts at social pull offs along the park's existing roads and primary visitor destinations. Past, present, and reasonably foreseeable actions in the immediate vicinity of Arches National Park also have affected and would continue to affect biological soil crust resources in the surrounding region.

Overall, impacts described under Alternative B, combined with impacts of other past, present, and reasonably foreseeable future actions within the park and in the immediate vicinity of the park would have short- and long- term, moderate and adverse cumulative impacts on soils.

Implementation of Alternative B would contribute to soil crust impacts inside the park, particularly at the Sand Dune Arch Trailhead parking area, and potentially outside the park. The contribution of Alternative B to these cumulative impacts would be moderate due to the small amount of soil crusts that would be disturbed in localized locations,



such as at the Sand Dune Arch Trailhead parking area. Therefore, overall, cumulative impacts would be short- term and long- term, moderate and adverse.

Conclusions Under Alternative B, there would be moderate, short- term and long- term, adverse effects on biological soil crusts inside the park, primarily as a result of construction of the Sand Dune Arch parking area. There would also be the potential for adverse effects on biological soil crusts outside the park if a new centralized operation and maintenance facility in Moab were constructed to support motorized tours. However, since the site location is unknown, the potential intensity and duration of these effects is not known at this time, and the location of this facility outside the park would avoid adverse effects inside the park. Other long- term beneficial effects would occur as a result of proposed actions of Alternative B. Overall, short- and long- term, cumulative impacts would be moderate and adverse. There would be no impairment of park resources or values related to biological soil crusts.

Visual Resources

Methodology

Assessment of potential impacts on visual and scenic resources is based primarily on a determination of the anticipated change in the character of the existing visual landscape, in comparison to existing conditions and observations based on site visits, photographs, and maps. The amount of area disturbed, the resulting landscape character in the areas of disturbance, and the ability to reclaim disturbed areas are used as indicators of the level of potential impacts on visual and scenic resources in the park.

For the purpose of this analysis, the thresholds of intensity for visual impacts are defined as follows:

Negligible: The action would introduce only the perception of some additional movement by cars or by people. The change to the viewshed (defined as the area comprised of all the surface areas visible from an observer's viewpoint) would be so small or localized that it would have no

measurable or perceptible consequence to the visitor experience of the viewshed.

Minor: The action would introduce perceptible non- natural, human- made additions to the viewshed. These actions would include structures that affect a relatively small portion of the viewshed, either the foreground, middleground, or background, and have barely perceptible visual consequences to the visitor experience of the viewshed.

Moderate: The action would introduce perceptible non- natural, human- made additions to the viewshed. These actions would include facilities, parking, and other structures and built elements that would affect a moderate portion of the viewshed. This might include the foreground and middleground, or the foreground and background. These actions would not completely alter the viewshed, but would be a visual addition to the existing conditions.

Major: The action would introduce multiple and drastic non- natural, human- made additions that affect the entire viewshed as experienced by the visitor. These actions would include facilities and parking areas, as well as other structures and built elements that would completely alter the foreground, middleground, and background of the existing viewshed.

The duration of impacts on visual resources is defined as follows:

Short- term: occurs only during the six- year construction/implementation period.

Long- term: occurs after the six- year construction/implementation period.

Environmental Consequences

Alternative A – No Action

Impact Analysis Under Alternative A the park would continue to manage existing transportation facilities in their current condition. Only minor improvements would be implemented, as already planned through the park's GMP and typical ongoing park maintenance and operations activities, on a case- by- case basis.



No additional development would occur in the park's viewsheds other than continued road and parking area maintenance. The GMP proposal to develop the Sand Dune Arch parking area would have resulted in alteration of the viewshed within that vicinity of the park, but the previously proposed configuration of the parking area has been changed, and instead a new configuration is proposed under Alternative B.

Visitation at the park is expected to increase over time, resulting in increases in the amount of motor vehicle traffic on park roads and at parking areas, as well as increases of people on trails and at park features. Consequently, views from along the road corridors and parking areas would include additional vehicles, and parking areas and turnouts would be somewhat more congested. Increased motor vehicle traffic would introduce new night light sources. These sources would be limited to localized areas in the park and would not be expected to contribute to sky glow.

Under Alternative A, existing roadside social parking and the related creation of social trails and possible disturbances to soil crusts and vegetation would continue to occur, creating potential impacts to the visual quality of areas immediately visible from park roads.

Continuation of current activities under this alternative would result in some changes to the visual landscape over time as a result of small scale maintenance improvements to roads and visitor facilities and increased visitation levels. These affects would result in negligible impacts on visual quality because no physical improvements would be installed that would adversely affect park viewsheds.

Alternative A would result in negligible, long-term adverse impacts on visual quality overall because changes would be limited to small areas around existing disturbed and developed areas and therefore would affect only small portions of viewsheds.

Cumulative Impacts Cumulative impacts to visual and scenic quality would include past, present, and planned additional development and/or modification to the natural and human-

made environment. Within the park, past projects include construction of the new Visitor Center, parking areas, the Delicate Arch road, and other visitor facilities. Those improvements have resulted in short- term impacts on visual quality during periods of construction due to placement of construction equipment, fencing, and other intrusions into a natural setting. These past projects also have contributed to the long- term alteration of the visual landscape in some areas of the park. However, the application of measures in the GMP to achieve architectural compatibility and minimize visual intrusion has resulted in only minor visual impacts within the park. Park projects proposed under the GMP, including trail rehabilitation and vegetation and fire management plans, would be anticipated to have only negligible visual impacts in the long- term because they would not involve constructing new additions that would dramatically alter the park's viewshed.

Past actions in the immediate vicinity of the park, namely from historical uranium- ore processing at the Moab uranium mill tailings site, have contributed to minor, long- term, adverse visual quality and sky glow impacts in the surrounding region. Ongoing and planned projects, including widening and resurfacing portions of US 191 in the vicinity of the park, also have and would continue to contribute to visual effects.

Overall, impacts described under Alternative A, combined with impacts of other past, present, and reasonably foreseeable actions within the park and in the surrounding region would result in negligible to minor, long- term, adverse cumulative impacts to visual and scenic quality. Short- term, minor adverse impacts would occur at locations of construction projects during the period of construction. The contribution of Alternative A to adverse effects on visual quality in the park would be minor because improvements would be limited to small areas around existing disturbed areas and would affect only a small portion of the viewshed. Overall, short- and long- term, cumulative impacts would be negligible to minor and adverse.

Conclusions Under Alternative A, No Action, there would be negligible to minor, long- term adverse impacts on the park's visual character and



resources, including night skies. Overall, short- and long- term, cumulative impacts would be negligible to minor and adverse. There would be no impairment of park resources or values related to visual quality.

Alternative B – Preferred Alternative

Impact Analysis Preservation of the visual resources inherent to the unique geologic character of the landscape is vital to the visitor experience at Arches National Park. In general, landscape changes associated with Alternative B would be compatible with the visual character of the park and, in many cases, would provide additional opportunities for scenic viewing and enjoyment of park resources.

Proposed improvements to existing parking areas would have varying effects on visual quality. Parking areas at the Windows/Double Arch, Wolfe Ranch/Delicate Arch Trailhead, Delicate Arch Viewpoint, and Devils Garden would simply be restriped and reconfigured within the existing paved areas to achieve more efficient parking. These improvements would be expected to have negligible adverse long- term impacts on visual quality because changes to viewsheds would be small and localized and would have no measurable or perceptible consequence to the visitor experience.

Proposed removal of 13,600 square feet of existing paved and social parking areas would be removed and the landscape rehabilitated at parking areas (6,200 square feet at Devils Garden, 5,250 square feet at Sand Dune Arch, and 2,150 square feet at the Windows/Double Arch). Rehabilitation of these areas to a more natural condition would result in beneficial effects, helping to offset negligible visual quality impacts in these areas.

The proposed expansion of the parking area at Sand Dune Arch would have a localized, but moderate, long- term effect on visual quality. These impacts would be considered moderate because the expanded parking areas would be a perceptible newly built addition in the viewshed at this location. The visitor viewing experience at these locations would not be completely altered,

but visual additions to existing conditions would be introduced in foreground views.

Proposed improvements at pull off areas throughout the park would provide the public with enhanced opportunities for scenic viewing. Placement of boulders and/or fencing is proposed at some pull offs, including pull offs 14, 15 and potentially at informal pull off D. Fencing would help to contain visitors at these viewpoints and minimize damage to soils and vegetation. Fencing would also be used to discourage and prohibit motorists from using some of the existing social pull off areas. Fencing would be designed and constructed to be compatible with the desert landscape. The visual impacts of these elements (fencing, boulders, etc) would be long- term and adverse but minor because they would be offset by the recovery of soil and vegetation in areas that previously experienced heavy foot traffic, and the design character of these elements would blend with the natural surroundings.

For safety and sight distance purposes, signs are proposed to be located in advance of several of the pull offs to be paved and formalizes (e.g., pull offs 1, 6, 7, 9, 10, 11, 13, 15, 16, 19, and 21). Proposed signs would have a long- term effect to viewsheds along park roads, particularly along the main park road, as a result of introducing new fixed structures in the roadside landscape. However, signs would be designed and sited to minimize their visual intrusion in a way that would be sensitive to the context of the desert landscape and compatible with the scenic characteristics of the Arches National Park driving experience, and that would result in barely perceptible consequences to the visitor experience. Therefore long- term impacts would be considered adverse but minor.

Traffic calming measures implemented in the park would include additional warning/regulatory signs, pavement texturing, pavement coloring or markers, rumble strips and other techniques for slowing traffic in appropriate areas such as pull offs, pedestrian crossings and trailheads. Such measures would have a minor, adverse long- term effect on visual quality, particularly along the main roads within the park. These impacts would be considered minor because the traffic calming



measures would be placed in and along existing roadways or other areas that are already developed. In addition, these measures would be designed and sited to minimize their visual intrusion in a way that is sensitive to the context of the desert landscape and compatible with the scenic characteristics of the Arches National Park driving experience. Therefore long- term impacts would be adverse but minor.

The creation of a new centralized operation and maintenance facility in Moab to support motorized interpretive tours could result in short-term and long- term impacts on visual resources outside the park. However, the type and intensity of potential impacts would depend on the size and character of the new facilities and the number and location of sensitive receptors. Temporary short-term visual impacts would include large equipment working in construction areas; dust and fumes created by earth- moving activities; and temporary parking of contractor and staff vehicles. Because of the facility's proposed location in Moab, a developed, urbanized area, long- term adverse impacts on visual quality likely would be negligible to minor. Short- term, adverse impacts during construction likely also would be negligible to minor. Assuming that tours would not operate during nighttime hours, impacts to night skies and corresponding sky glow effects would not occur. The design and development of the tour operations facility in Moab would comply with all applicable local, state and federal standards and requirements including applicable design requirements of the city of Moab.

Over the long term, operation of motorized interpretive tours would potentially decrease the use of motor vehicles in the park, particularly during periods of peak visitation. This in turn would help to reduce some of the most prevalent visual impacts that currently affect the park: congestion in parking areas due to vehicles circulating to find spaces, and social pull off and parking activity in undesignated areas throughout the park. Reducing these activities would result in an overall long- term beneficial effect on visual quality within the park.

Proposed ITS actions would help to monitor and manage traffic flow and reduce congestion at the park's visitor destinations. These actions would not affect visual or scenic quality because proposed improvements would not involve construction of new facilities. New components of the ITS system would be housed in existing facilities and developed areas of the park.

Other proposed actions include continued partnerships with local and regional interests, expanded visitor recreation and interpretation opportunities, ongoing VERP monitoring, and implementing various visitation and congestion management strategies, such as the development of a new picnic area at the Delicate Arch Viewpoint, which would help disperse this activity in the park and reduce congestion in other areas. Any improvements associated with these proposed actions (such as picnic tables) would be installed in an already developed area, with specific care to site the facilities so as not to interfere with prominent viewsheds or appreciably change visual character. Therefore, any long- term adverse effects of these measures on visual quality in these areas would be negligible to minor because the improvements either would not be perceptible or would have barely perceptible visual consequences on the visitor experience.

Protection and rehabilitation of roadside pull off areas and congestion management strategies, including ITS applications, also would result in beneficial effects on scenic and visual quality by dispersing visitation to other developed destinations within the park and helping to relieve vehicle congestion and social pull off and parking activities in other areas.

Construction activities proposed under Alternative B would result in temporary short-term, negligible to minor, adverse impacts to visual resources.

Cumulative Impacts Past, present, and reasonably foreseeable projects within and in the vicinity of Arches National Park with adverse impacts to visual quality under Alternative A would also apply to Alternative B. Implementation of Alternative B would alter visual quality both



within park boundaries, particularly within the corridors of the park's main roads and at the proposed Sand Dune Arch parking area, and outside the park at the site of the new centralized operation and maintenance facility in Moab.

The impacts of past, present, and reasonably foreseeable future activities, in conjunction with Alternative B, would result in minor to moderate, long- term adverse impacts to visual quality both within and in the immediate vicinity of the park. Negligible to minor, short- term, adverse impacts to visual resources would occur at the locations of construction projects temporarily, during the construction period. Alternative B would contribute at negligible to moderate levels to long- term cumulative impacts on visual resources and at negligible to minor levels to short- term cumulative impacts. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse.

Conclusions Under Alternative B, there would be negligible to minor short- term and negligible to moderate long- term adverse impacts on visual quality both within and outside the park. Some long- term beneficial effects would occur. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse. There would be no impairment of park resources or values related to visual quality.

Visitor Use, Visitor Experience, and Recreational Resources

Methodology

Potential impacts on visitor use, visitor experience, and recreational resources are assessed qualitatively for each alternative. Visitor use, experience, and recreational resources information and analysis is based on a review of several documents, including the *Arches National Park GMP* (1989), the park's *VERP Implementation Plan* (1995), the *Superintendent's Annual Narrative Report* (2004), and various other documents, as well as visitor surveys conducted in 2003, multiple visits to the park and region during all seasons of the year, and several workshops involving park

staff, regional stakeholders, and the general public.

For the purpose of this analysis, the thresholds for visitor use, experience and recreational resource impacts are defined as follows:

Negligible: Effects are not detectable – and action would have no measurable or discernible effect on recreational opportunities, visitor use, or visitor experiences. Visitors would not be affected or changes in visitor experience would be below the level of detection and visitors would not likely be aware of the effects associated with the alternative.

Minor: Impacts are slightly detectable, but would not be expected to have an overall effect on recreational opportunities, visitor use or experience. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.

Moderate: Impacts are clearly detectable and would have an appreciable effect on recreational opportunities, visitor use, or experience. Changes in visitor experience or safety would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.

Major: An action would have substantial, highly noticeable effects on recreational opportunities, visitor use, or experience. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

The duration of impacts on visitor use, visitor experience, and recreational resources is defined as follows:

Short- term: occurs only during the six- year construction/implementation period.

Long- term: occurs after the six- year construction/implementation period.



Environmental Consequences

Alternative A – No Action

Impact Analysis Under Alternative A, the No Action alternative, planned improvements as well as ongoing operations and maintenance activities in the park would continue as authorized under the existing GMP. The park would continue to manage facilities and services to meet NPS and park planning objectives with the objective of maintaining a high quality visitor experience to the maximum extent possible, balanced with other objectives such as resource preservation and protection. However, some existing and ongoing activities in the park likely would continue to adversely affect visitor use, visitor experience, and recreational resources in minor to moderate levels over the long- term. For example, social pull off activity along the roadsides and the associated effects to visitor experience and safety would continue (at approximately 200 locations).

Creation of social trails would continue near social pull off areas and surrounding parking areas as attractions within the park continue to experience crowding and congestion during peak visitation periods. Parking areas would continue to experience congestion and visitors would continue to experience disorientation during peak periods trying to find places to park and pull off the road, particularly at key features such as the Windows and Devils Garden. Instances of noncompliance with the visitor experience standards and key indicators of the *VERP Implementation Plan* likely would continue at popular features during peak periods, and the frequency that visitor experience conditions fail to meet standards may increase if visitation continues to increase in the coming years, signifying degradation of visitor experience where measured.

Ongoing monitoring of VERP under this alternative would provide a tool to support ongoing management of visitor experience and may help to mitigate potential impacts if interim actions are implemented to correct noncompliance and if funding continues to be made available for VERP monitoring and implementation. However, annual funding is not

assured for this program, and over the long- term, visitor experience could continue to degrade without implementation of more permanent measures and actions.

There would continue to be an unmet demand for general motorized sightseeing tours of the park, and other new enhancements to visitor experience would not occur. Visitor safety and orientation enhancements through traffic calming and ITS improvements also would not be implemented.

Cumulative Impacts Past, present, and reasonably foreseeable future actions have resulted in short- term, minor to moderate, adverse effects on visitor use and experience and recreational resources during construction of improvements along US 191, the new entrance to the park and the new Visitor Center. However, completion of these projects has resulted in an overall long- term beneficial effect on visitor experience, particularly due to the reduction in time related to queuing and waiting at the park entrance and enhanced visitor opportunities associated with the new Visitor Center.

With ongoing cooperation and coordination between regional tourism and recreation interests, the potential for cumulative adverse impacts of past, present, and reasonably foreseeable future projects in the region would be minimized.

The recently completed project extending a multi- use pathway to the park along US 191, along with other existing and planned trails and linkages (bridge across the Colorado River) would increase the level of visitors coming to the park by bicycle.

Overall, the cumulative impact of past, present, and reasonably foreseeable future activities combined with implementation of Alternative A would result in short- term and long- term minor to moderate adverse effects on visitor use, visitor experience and recreational resources. Alternative A would contribute to these cumulative effects at a minor to moderate level, depending on future park visitation levels, over the long term. (If visitation increases, the level of impact would likely increase.) Recent completion of improvements to US 191, the park entrance and



the new Visitor Center have resulted in long- term beneficial effects localized at the entrance area.

Conclusions Alternative A would result in minor to moderate, long- term adverse impacts to visitor use, visitor experience and recreational resources. The level of impact would be expected to become more intensive if the level of visitation increases and conditions at key features and along the park roadways become more congested. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse, although some beneficial effects have resulted from past, present and reasonably foreseeable cumulative actions. The National Park Service does not analyze visitor use, visitor experience, or recreational values for impairment.

Alternative B – Preferred Alternative

Impact Analysis Long- term beneficial effects to visitor experience and recreational opportunities would be expected under Alternative B. Although visitor use may increase over time as a result of proposed actions being implemented, the proposed actions under Alternative B include improvements, management tools and strategies to help ensure that increased visitation would be managed effectively.

Long- term beneficial effects would result from proposed improvements for parking areas, including the implementation of the Sand Dune Arch parking area. Traffic safety, circulation, and flow would be improved, which would in turn enhance the visitor experience at these locations. Reduced congestion on trails at key features also likely would result since parking capacities would be more easily maintained to a level acceptable in accordance with VERP standards.

Long- term beneficial effects to visitor experience and expanded recreational opportunities would result from formalizing some of the existing roadside pull off areas for permanent use. Other existing roadside pull off areas being used socially by visitors would be removed. These pull offs are in locations that are not suitable for ongoing use in consideration of roadway design standards and are causing damage and disturbance to park resources, which in turn detracts from the visitor

experience overall. The excessive number of pull offs concentrated in certain areas and the pedestrian social trails created in these areas also tend to diminish visitor experience due to congestion and confusion – a problem that would be addressed by this alternative.

Long- term beneficial effects to visitor experience would be expected as a result of implementing traffic calming improvements in areas where there is excessive vehicular speeding near and at pedestrian activities areas.

Short- term, minor to moderate adverse effects to visitor use, visitor experience and recreational resources would occur during construction of proposed parking area, pull off, and traffic calming improvements. These effects would be mitigated by the dissemination of information to visitors (through printed materials, signing, radio broadcasts and other means) about construction activities, which would include suggestions for visiting areas of the park not under construction. Also, where possible, construction would be phased and staged to avoid peak annual visitation periods and cause the least amount of disruption during peak daily use periods.

Motorized interpretive tours would expand interpretive and recreational (sightseeing) opportunities for visitors and address an increasing demand for this type of service in the park. Additionally, lower- capacity motor vehicle trips would be replaced by tour bus trips, resulting in fewer overall vehicles in the park and reduced congestion along the park road and at key feature and trailhead parking areas. Tour routing and frequency would be programmed to avoid creating crowded conditions at park features and trailheads. Guided tours at key features would provide visitor education and management opportunities that would benefit park resources over the long- term. One of the most important benefits motorized interpretive tours would provide related to visitor experience would be the opportunity for a “car free” experience in the park. Visitors would be able to leave their cars behind in Moab and travel to, through, and from the park in a comfortable sightseeing vehicle equipped with onboard interpretation. This



would enable more visitors to enjoy the scenery and learn about special features of the park.

Implementation of ITS proposed actions would result in long- term beneficial effects through enhanced visitor experiences due to improved visitor orientation and wayfinding (both pre- trip and on- site), as well as reduced traffic congestion in the park.

Other proposed actions, which include ongoing monitoring of VERP, ongoing partnerships and coordination between regional agencies and interests, and management strategies to disperse visitation, would all be expected to enhance visitor experience over the long term. Reduced overall congestion at key features and trailhead parking areas throughout the year would result, improving visitor experience in the park.

The provision of an additional picnicking facility in an existing, developed parking area (Delicate Arch Viewpoint) would help to disperse visitation to an area of the park that is not typically as congested other areas, and it would provide enhanced recreation opportunities.

The strategy related to limiting visitation to key features (such as Delicate Arch) through permit systems, park- guided tours or other means at peak visitation periods would help to ensure that visitor experience goals are met overall. More intensive management of visitation to features (like is done for Fiery Furnace) could be negatively perceived by some visitors. This adverse effect likely would be long- term and minor to moderate in that it would be discernable to some park visitors during peak visitation periods. Some visitors would be aware of the action and likely would express an opinion, but the overall effect would be beneficial for most visitors and park resources over time. Closure of features would not occur. Rather, access would be managed to minimize congestion and overcrowding during peak periods (through permit systems or guided tours, specific time assignments for visits, and managing the number of people at one time at these features). Managed access to and within the vicinity of key features during peak visitation periods would preserve visitor opportunities overall.

Cumulative Impacts Past, present, and reasonably foreseeable actions within and in the vicinity of Arches National Park with impacts to visitor use, visitor experience, and recreational resources related to Alternative A also would apply to Alternative B. Short- term, minor to moderate, adverse effects on visitor use and experience have occurred during construction of improvements along US 191, the new entrance to the park and the new Visitor Center. However, completion of these projects has resulted overall in long- term beneficial effects on visitor experience, particularly due to the reduction in time related to queuing and waiting at the park entrance and opportunities associated with the new Visitor Center.

With ongoing cooperation and coordination between regional tourism and recreation interests, the potential for cumulative impacts of past, present, and reasonably foreseeable future projects would be minimized. For example, ongoing coordination and management would help in making visitors aware of bicycling conditions in the park and restrictions on mountain biking on trails and off- road in the park and the opportunities for mountain biking that can be found in other areas of the region.

The cumulative impact of past, present, and reasonably foreseeable future activities combined with implementation of Alternative B would result in minor to moderate, short- term adverse effects on visitor use, visitor experience, and recreational resources during construction and long- term minor to moderate adverse effects related to visitor management at key features during peak visitation periods. Overall, proposed actions of Alternative B combined with cumulative effects of past, present, and reasonably foreseeable future actions would result in long- term beneficial effects.

Alternative B would contribute at a minor to moderate level to short- term impacts during construction and at a minor to moderate level to long- term adverse impacts as a result of visitor management at key features. Alternative B proposed actions would contribute to beneficial cumulative effects to visitor use, visitor experience, and recreational resources.



Conclusions Alternative B would result overall in short- term, minor to moderate adverse effects during construction of proposed improvements that would be mitigated. Proposed visitor access management would result in long- term, minor to moderate, adverse effects to some visitors at localized areas of the park during peak visitation periods. These adverse effects would be offset by substantial long- term beneficial effects to all park visitors and visitor experience, as well as park resources. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse, although beneficial effects would continue to be realized from past, present and reasonably foreseeable actions combined with Alternative B. The National Park Service does not analyze visitor use, visitor experience, or recreational values for impairment.

Transportation and Traffic

Methodology

Potential impacts related to transportation and traffic conditions are assessed qualitatively for each alternative. Traffic and transportation information and analysis is based on a review of several documents, including the *Arches National Park GMP* (1989), the *Arches National Park Engineering Study for Roads* (RS Engineering, 2002), *Arches National Park Road Pullout Analysis Report* (EDAW, March 2001), *Arches National Park Intelligent Transportation Systems Study* (LTK and Jonathan Upchurch, 2005), *Arches National Park Roadside Pull Off Analysis* (Otak, Inc., 2005), and various other documents, as well as visitor surveys conducted in 2003, multiple visits to the park and region during all seasons of the year, and several workshops involving park staff, regional stakeholders, and the general public.

For the purpose of this analysis, the thresholds for transportation and traffic impacts are defined as follows:

Negligible: Effects are not detectable – and action would have no measurable or discernible effect related to transportation conditions and/or traffic flows and safety.

Minor: Impacts are slightly detectable, but the action would not be expected to have an overall effect on transportation conditions and/or traffic flows and safety.

Moderate: Impacts are clearly detectable and would have an appreciable effect on transportation conditions and/or traffic flows and safety. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.

Major: An action would have substantial, highly noticeable effects to and permanent alterations of conditions related to transportation conditions and/or traffic flows and safety. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

The duration of impacts related to transportation and traffic conditions is defined as follows:

Short- term: occurs only during the six- year construction/implementation period.

Long- term: occurs after the six- year construction/implementation period.

Environmental Consequences

Alternative A – No Action

Impact Analysis Under Alternative A, the No Action alternative, planned improvements and ongoing operations and maintenance activities in the park would continue in accordance with the existing GMP. Social pull off activity along the roadsides and the associated effects to transportation and traffic flows and safety would continue (at approximately 200 locations). The creation of social trails alongside social pull offs and parking areas would continue, particularly as key park features continue to experience crowding and congestion during peak period visitation levels. Parking areas would continue to experience congestion and visitors would continue to experience disorientation during peak periods trying to find places to park and pull off the road, particularly at key features such as the Windows and Devils Garden. If visitation grows



over the long term, these problems would worsen if not addressed.

There would continue to be an unmet demand for general motorized sightseeing tours of the park. Under Alternative A, traffic and transportation problems would continue, as would burdens on park ranger and staff time related to managing parking congestion, social pull off and parking activity, and vehicle/visitor access and circulation throughout the park. Over the long- term, traffic and transportation conditions likely would continue to degrade without implementation of more permanent measures.

These conditions under Alternative A would result in minor to moderate, long- term, adverse impacts on transportation and traffic conditions and facilities.

Cumulative Impacts Cumulative impacts associated with past, present, and reasonably foreseeable future projects under Alternative A include several recent projects completed in the vicinity of the park entrance, as well as past projects such as development of parking areas and the Delicate Arch road. These actions resulted in minor to moderate, short- term adverse effects to transportation and traffic in those areas during construction. However, completion of these projects resulted in an overall long- term beneficial effect on transportation and traffic. For example, recent improvements at the park entrance resulted in an appreciable reduction in time, and more space for vehicles off the highway for waiting in line to enter the park. Implementation of the proposed improvements of the 2002 roadway safety study also would help to improve conditions for travelers in the park (within the parameters of allowable improvements under the existing GMP).

However, overall under Alternative A, it is anticipated that traffic and transportation problems would persist throughout the park over the long term. As such, the cumulative effect of other past, present, and reasonably foreseeable future actions, combined with Alternative A, would result in minor to moderate, long- term, adverse impacts. Alternative A would contribute a minor to moderate level to these to overall

cumulative impacts, with the level of effect correlating with future visitation and congestion levels in the park.

Conclusions Alternative A would result in minor to moderate, long- term, adverse impacts related to traffic and transportation, with the level of effect depending on future visitation and congestion levels and conditions at key features and throughout the park. Overall, short- and long- term, cumulative impacts would be minor to moderate and adverse (although some localized beneficial effects have resulted from recent improvements at the park entrance and past park improvements). There would be no impairment to park resources or values related to transportation and traffic conditions.

Alternative B – Preferred Alternative

Impact Analysis Long- term beneficial effects related to traffic and transportation would be expected under Alternative B. Although visitor use and the potential for associated traffic congestion may increase over time, the actions proposed include improvements, management tools, and strategies to ensure that increased visitation (and associated increases in traffic) would be managed effectively. Short- term, minor to moderate, adverse impacts would occur during construction of proposed improvements. These impacts would be mitigated by traffic control and signing, construction phasing, visitor communications and other measures.

Long- term beneficial effects would result from improvements proposed for parking areas, including the implementation of the Sand Dune Arch parking area. Traffic safety, circulation, and flow would be improved. Reduced congestion within the parking areas for key features and along trails would result since parking capacities would be more easily maintained to acceptable levels in accordance with VERP standards.

Long- term beneficial effects to traffic safety throughout the park would result from formalizing the proposed roadside pull off areas for permanent use. Existing social pull off areas that present hazards to travelers would be removed from ongoing use. Formalizing pull offs



in suitable locations consistent with roadway safety standards would ensure that park visitors have sufficient space to pull to the side of the road in emergencies and to let other vehicles pass.

Long- term beneficial effects to traffic, pedestrian, and bicycle safety would be expected as a result of implementing proposed traffic calming improvements in areas where there is excessive vehicular speeding, particularly near and at pedestrian activity areas.

Motorized interpretive tours also would result in long- term beneficial effects by expanding visitor access opportunities, improving transportation and traffic conditions in the park, and providing an alternative means of access and travel to, through, and from the park. Lower capacity motor vehicle trips would be replaced by higher capacity tour bus trips, resulting in less overall vehicles in the park and reduced congestion along the park roads and at key feature and trailhead parking areas. Implementation of the parking and pull off improvements of this alternative also would help to ensure that tour vehicles would be accommodated at key locations throughout the park.

Implementation of proposed ITS actions would result in long- term beneficial effects from reduced congestion throughout the park, including at key feature parking areas. Through improved orientation to parking conditions and typical times of congestion in the park, visitors may choose to plan their trips to avoid peak visitation periods.

Other proposed actions, which include ongoing monitoring of VERP, ongoing partnerships and coordination between regional agencies and interests, and management strategies to disperse visitation would all be expected to reduce traffic problems and enhance access and circulation to, from, and within the park over the long- term. Reduced overall congestion at key feature and trailhead parking areas throughout the year would result.

Cumulative Impacts Past, present, and reasonably foreseeable projects within and in the vicinity of Arches National Park with impacts to

transportation and traffic under Alternative A also would apply to Alternative B. Short- term, minor to moderate, adverse effects have occurred during construction of improvements along US 191, as well as improvements in the park such as at the new entrance and Visitor Center. These cumulative effects have been offset by overall long- term beneficial effects on transportation and traffic flows and safety with completion of these projects. Implementation of the proposed actions of the 2002 roadway study (to the level allowable according to the provisions of the current GMP) would help to improve the overall function of the road for use by various vehicles. The addition of proposed actions under Alternative B would further result in long- term, beneficial effects to transportation and traffic conditions. Minor to moderate, short- term impacts during construction of proposed improvements would contribute to the level of cumulative impacts, but these impacts would be mitigated through various measures and offset by the longer term beneficial effect.

Conclusions Long- term beneficial effects related to transportation conditions and traffic flows and safety would occur under Alternative B. These effects would be expected as a result of reduced traffic congestion in parking areas, improved safety on the park roadways from pull off and traffic calming improvements, and improved operations of the park's overall transportation system. Minor to moderate, short- term adverse effects would occur during construction, but would be mitigated. Overall, short- term, cumulative impacts would be minor to moderate and adverse, offset by long- term beneficial impacts resulting from recent past and improvements at the park and proposed actions of Alternative B. There would be no impairment of park resources or values.

Park Operations

Methodology

Potential impacts on park operations are assessed qualitatively and quantitatively (at a general level) for each alternative. Park operations information and analysis is based on a review of several



documents, including the *Superintendent's Annual Narrative Report* (Fiscal Year 2004), *Arches National Park GMP* (1989), the park's *VERP Implementation Plan* (1995), and various other documents, as well as National Park Service website information, visitor surveys conducted in 2003, multiple visits to the park and region during all seasons of the year, and several workshops involving park staff, regional stakeholders, and the general public.

For the purposes of this analysis, the thresholds for impacts on park operations are defined as follows:

Negligible: Effects would not be detectable – an action would have no measurable or discernible effect on park operations.

Minor: Impacts would be slightly detectable, but would not be expected to have an overall appreciable effect on park operations. If mitigation is needed to offset adverse effects, it would be relatively simple and likely successful.

Moderate: Impacts would be clearly detectable and readily apparent and would result in changes to park operations that would be noticeable to staff and the public. Mitigation measures would be necessary to offset adverse effects and would likely be successful, (but mitigation such as increased staffing and resources, such as equipment, and vehicles may not be assured).

Major: An action would have substantial, highly noticeable effects on park operations, resulting in substantial, highly noticeable changes. Mitigation measures to offset adverse effects would be needed, would be extensive, and success would not be assured.

The duration of impacts on park operations is defined as follows:

Short-term: occurs during the six- year construction/implementation period

Long-term: occurs after the six- year construction/implementation period

Environmental Consequences

Alternative A – No Action

Impact Analysis Under Alternative A, the No Action alternative, planned improvements and ongoing operations and maintenance activities in the park would continue, consistent with the existing GMP. Social pull off activity along the roadsides and the associated effects to visitor experience and safety would continue (at approximately 200 locations) and more would be created over time. The creation of social trails would continue adjacent to social pull offs and parking areas for popular features in the park, particularly with increases in visitation, crowding, and congestion during peak periods.

As such, it is anticipated that demands on park staff and resources would continue to increase. A considerable amount of staff time would continue to be needed for managing parking congestion, patrolling park roadways and assisting visitors in finding parking and accessing park attractions, particularly during peak periods of visitation. A considerable level of park resources and staffing would also continue to be devoted to monitoring damages caused by social pull offs and social trail activity in these areas and near the parking areas of popular attractions.

Under Alternative A, there would not be an additional need for staff support for new tour programs or development of capital projects (such as interpretive staff/guides to support tours). There would be a need for ongoing funding and staffing for VERP monitoring.

Overall, Alternative A would result in minor to moderate, long- term adverse effects on park operations. These impacts could be mitigated through the provision of increased staff time and resources.

Cumulative Impacts The impacts of other past, present, and reasonably foreseeable actions combined with Alternative A would result in minor to moderate long- term adverse effects. A number of past and present actions implemented under the current GMP (including development of the new visitor entrance station and Visitor Center) and various improvements to key feature



and trailhead parking areas throughout the park have provided and continue to provide long-term beneficial effects to park operations – improving visitor services and facilities and maximizing efficiency in maintenance and management activities. However, over the long term, Alternative A (No Action) would contribute at minor to moderate levels to adverse cumulative effects as a result of ongoing social pull off, social trails, and parking activities, as well as increased visitation and congestion at key features. Impacts would be mitigated by the park's capability to provide adequate staff and resources in the future to address these issues. The park regularly evaluates opportunities for improving park operations through ongoing management initiatives, programs, and projects.

Conclusions Under Alternative A, there would be long-term, minor to moderate adverse impacts to park operations that would need to be mitigated through additional staffing and resources. Overall, long-term cumulative impacts would be minor to moderate and adverse. The National Park Service does not analyze park operations for impairment.

Alternative B – Preferred Alternative

Impact Analysis Long-term beneficial effects to park operations would be expected under Alternative B. There would be a need for ongoing funding for VERP monitoring, as well as the need for staffing during capital project implementation and in support of motorized interpretive services. These needs would result in short-term, minor to moderate, adverse impacts. These impacts could be mitigated by additional staff time and resources as discussed in Chapter 2.

Over the long term, staff time dedicated to law enforcement, patrolling, and management of roadside pull offs in undesignated areas, speeding on park roads, and traffic circulation and pedestrian safety conditions throughout the park may appreciably decrease and if so, staff could be reassigned and reallocated to other park needs, including VERP monitoring, visitor education and interpretation, and other activities.

Visitor use may increase over time as a result of proposed actions being implemented, particularly

during the shoulder seasons, which may require reallocation of staff time. However, these changes would be expected to be gradual and manageable, and as such would result in negligible to minor adverse effects on park operations. Proposed actions under Alternative B include improvements, management tools, and strategies help ensure effective management of increased visitation levels.

During the implementation of proposed actions, it is anticipated that a minimum of one full-time, permanent staff person with transportation knowledge and expertise would be needed to assist in implementing and directing the proposed actions under Alternative B. In addition, one half-time to full-time permanent staff person would be needed to assist with development of interpretive programs for the motorized sightseeing tours. This position could be temporary or permanent during the implementation phase, depending on how the motorized tour program is structured. Over the long term, reallocation of staff time as a result of reduced demands related to management of traffic and parking conditions may decrease or eliminate the need for these additional staff positions beyond the six-year implementation period.

Additional staff would be needed as interpretive tour guides if this service is provided by the park. (This could also become a service covered by the tour provider under the mid-range and higher cost tour operation scenarios.) If the park provides interpretive guides, a minimum of four additional staff during the tour pilot program and a total of seven additional staff with full implementation of the tour program would be needed, with some potential fluctuations seasonally. The provision of these interpretive tour guides by the park is optional; the motorized tour provider could be responsible for these services instead. If the park provides the guides, they would be needed over the long term unless this responsibility is transferred to the tour provider at some time in the future.

The staff positions during implementation would in part help to support the establishment of the motorized interpretive tour program. The transportation staff person specifically would



assist in directing proposed parking area and roadside pull off improvements in conjunction with existing park management staff, in addition to helping establish the tour program.

Implementation of the actions proposed under Alternative B would be contingent upon availability of capital funding. Estimated capital costs of implementing improvements are provided in Chapter 2.

Long- term beneficial effects to park operations would result overall from improvements proposed for parking areas, including the implementation of the Sand Dune Arch parking area. Traffic safety, circulation, and flow would improve, which would in turn reduce the need for park staffing to manage congestion and assist with visitor orientation in these areas. Reduced congestion on trails at key features also likely would result since parking capacities would be more easily maintained to a level acceptable in accordance with VERP standards. In the near term (the next six years), implementation of parking proposed actions would require capital funding. Project funding would be needed for improvements to existing parking areas, as well as construction and demolition associated with the Sand Dune Arch parking area.

Long- term beneficial effects to park operations would result from formalizing roadside pull off areas for permanent use since less staff time would be needed for management of roadside pull off activities. Removal of existing roadside pull offs in undesirable locations would lessen the demand on staff time for monitoring and patrolling of these areas. In the near term (the next six years), implementation of the roadside pull off improvements would require capital funding for formalizing 21 pull offs and retaining 5 pull offs, as well as for closure, protection, and environmental rehabilitation of over 170 social pull offs.

Long- term beneficial effects to park operations would result from implementation of traffic calming improvements in areas where there is excessive vehicular speeding near and at pedestrian activity areas. Improving traffic safety in the park would reduce demand on staff time devoted to responding to incidents and collisions.

In the near term (the next six years), implementation of traffic calming would require capital funding.

Implementation of ITS proposed actions would result in long- term beneficial effects to park operations due to improved levels of visitor orientation and reduced traffic congestion in key feature parking areas during peak periods, thus lessening demands on park staff time devoted to these efforts. Implementation of proposed ITS actions would require capital funding during the implementation phase.

Other proposed actions, which include ongoing monitoring of VERP, ongoing partnerships and coordination between regional agencies and interests, and management strategies to disperse visitation would all be expected to reduce demands on park staff and operations related to transportation facilities and services over the long term. Reduced overall congestion at key feature and trailhead parking areas throughout the year would result, reducing the need for park operations to focus in these areas. Park staff time and resources would be able to be reassigned and reallocated to programs that enhance the visitor experience, such as additional guided tours and interpretive programs and VERP monitoring.

The provision of an additional picnicking facility in the existing Delicate Arch Viewpoint may require park management to adjust maintenance and operations plans and staffing accordingly. However, the addition of the picnicking facility would not be expected to create an appreciably higher demand for staffing, and as such, related adverse impacts would be negligible to minor. Implementation of an additional picnicking facility would require capital funding.

The strategy related to managing visitation at key features (such as Delicate Arch) through guided tours or other means at peak visitation periods would help to ensure that VERP goals are met. Such methods would require additional staff time devoted to more intensive management of visitation to features (like is done for Fiery Furnace). With the expected reduction in staff time devoted to roadside pull off monitoring, parking management, and other transportation



related activities, more staff time over the long term could be devoted to more intensive management of key features, when and if needed, depending on future visitation levels and conditions at popular features.

Cumulative Impacts Past, present, and reasonably foreseeable actions within and in the vicinity of Arches National Park with impacts on park operations under Alternative A also would apply to Alternative B. Over the long term, beneficial effects would result from these cumulative effects, and when combined with the proposed actions under Alternative B beneficial effects would intensify.

During the short term, additional staff and resources would be needed to support implementation of proposed improvements and programs, contributing to short- term, minor to moderate, and adverse cumulative impacts. These impacts would be mitigated by the provision of staffing and resources as prescribed in Chapter 2. Over the long- term, there would be beneficial cumulative effects on park operations overall, with less demand for staffing and resources devoted to managing transportation functions in the park.

Conclusions Under Alternative B, beneficial, long- term effects on park operations would occur, resulting from reduced overall demand for park staffing and resources focused on transportation and traffic management. Additional staffing and resources would be needed to mitigate short- term, minor to moderate, adverse effects during the implementation period. Overall, short- term, cumulative impacts would be minor to moderate and adverse, offset by mitigation, as well as long-term beneficial impacts resulting from recent improvements at the park entrance and the proposed actions of Alternative B. The National Park Service does not analyze park operations for impairment.

Socioeconomics

Methodology

Potential impacts on socioeconomics are assessed qualitatively for each alternative. Socioeconomics information and analysis is based on a review of several documents, including the *Impacts of Visitor Spending on the Local Economy: Arches National Park* (2003), the *Superintendent's Annual Narrative Report* (2004), and various other documents, as well as visitor surveys conducted in 2003, multiple visits to the park and region during all seasons of the year, and several workshops involving park staff, regional stakeholders, and the general public.

For the purpose of this analysis, the thresholds for impacts on socioeconomics defined as follows:

Negligible: Effects to socioeconomic conditions would be below the level of detection with no discernable effect on the character of the social and economic environment.

Minor: The effects to socioeconomic conditions would be slightly detectable. Any effects would be small, and if mitigation is needed to offset potential adverse impacts, it would be simple and successful and not be expected to alter the character of the established social and economic environment.

Moderate: The effects to socioeconomic conditions would be readily apparent and any effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it would be more extensive, but would likely be successful and would have an appreciable effect on the social and economic environment.

Major: The effects to socioeconomic conditions would be readily apparent and would cause substantial changes to the social and economic conditions of the region. Mitigation measures to offset potential adverse effects would be extensive, and their success would not be guaranteed and would likely have a noticeable effect on the social and economic environment.



The duration of impacts on socioeconomics is defined as follows:

Short-term: occurs only during the six-year construction/implementation period.

Long-term: occurs after the six-year construction/implementation period.

Environmental Consequences

Alternative A – No Action

Impact Analysis Under Alternative A, the No Action alternative, planned improvements and ongoing operations and maintenance activities in the park would continue consistent with the park's existing GMP. Socioeconomic opportunities associated with implementation of the motorized interpretive tour program would not be realized. No additional beneficial or adverse impacts would be expected as a result of implementation of Alternative A.

Under current conditions, Arches National Park is a major tourism destination and economic development generator for the region. Current visitor spending and revenue generation statistics, as well as projected trends would not be affected either adversely or positively by implementation of Alternative A since this alternative would do nothing to change current patterns or trends in visitation or spending.

Since no construction activities are proposed, this alternative would not affect the local economy or housing supply.

Cumulative Impacts No short-term or long-term adverse or beneficial impacts to regional socioeconomic conditions as a result of implementation of Alternative A, combined with other past, present, and reasonably foreseeable future actions would be expected. The potential for long-term beneficial effects related to strengthened economic vitality at the local and regional level in combination with other cumulative actions would exist with or without implementation of Alternative A.

Future development of land along US 191 between the park entrance and Moab is planned as part of the *North Corridor Gateway Plan*. The plan

proposes to develop a variety of interim uses on the Atlas mill and tailings site over the next 15- 20 years. In the long range, development of this area and other economic growth and development in the community overall, combined with ongoing park management and operations under Alternative A, could result in effects to local and regional socioeconomic conditions, but these effects can not be specifically defined and quantified at this time.

Conclusions No beneficial or adverse, short-term or long-term impacts to socioeconomic conditions would be expected under Alternative A and current trends in economic growth and development would be expected to continue. Overall, no beneficial or adverse, short-term or long-term cumulative impacts would be expected. The National Park Service does not analyze socioeconomic values for impairment.

Alternative B – Preferred Alternative

Impact Analysis Long-term beneficial effects to socioeconomic conditions would be expected under Alternative B. The proposed actions under this alternative include park improvements, management tools, and strategies to ensure ongoing effective management if visitation increases. Construction of proposed parking area, pull off, and traffic calming improvements likely would result in short-term beneficial socioeconomic effects during construction related to construction labor opportunities and economic benefits resulting from the spending of construction contractors in the region.

The action proposed under Alternative B with the greatest potential for long-term, beneficial economic effect would be implementation of the motorized interpretive tour program. Motorized interpretive tours would expand interpretive and recreational (sightseeing) opportunities for visitors and would address an increasing demand for this type of service in the park. Implementation of the motorized interpretive tour program would create long-term beneficial effects to the regional economy. This program would expand visitor access opportunities to Arches National Park.



The tour program would bring the direct benefit of additional employment opportunities and business related revenue to the region. The tour program has the potential to indirectly benefit other businesses in the region as well (i.e. restaurants, lunch catering businesses, overnight facilities if visitors choose to extend their stays to include a tour in their trip, and other establishments.) Financial feasibility analysis has confirmed that the tour program could become a self- sustaining private enterprise with some initial support from the government to help establish operations. Proposed prices for tours would be within a range that is comparable to the costs for similar tours at other national parks in the region and around the country and marketable to general park visitors.

The specific level of anticipated beneficial economic effects is difficult to quantify at this time since operational details related to the tour program are still undetermined. However, it is important to note that the tour program would provide additional local business, employment, and income opportunities in a region where per capita income typically ranks below the Utah state and national averages and the rate of unemployment typically is significantly higher than state and national levels overall.

Since there currently are no tour services or programs in the region offering the specific type of general sightseeing experience proposed under Alternative B, no economic impacts to other types of tour businesses and enterprises would be expected. Other tour programs cater to adventure- seekers and customers seeking outdoor guided experiences that provide a higher range of services and in turn are offered at higher prices than proposed for the motorized interpretive tour program. Refer to Chapter 3 for more description related to existing tour services in the region.

Implementation of proposed ITS actions may increase visitor awareness about tourism and recreation opportunities associated with the park and region, and as such likely would have a long-term, beneficial effect on socioeconomic conditions, but these effects probably would not

be at a level that would affect local and regional economic conditions.

Other proposed actions, which include ongoing monitoring of VERP, ongoing partnerships and coordination between regional agencies and interests, and management strategies to disperse visitation would not be expected to impact socioeconomic conditions to a discernable degree.

The strategy related to limiting visitation at key features (such as Delicate Arch) through permit systems, guided tours or other means at peak visitation periods would not be expected to affect socioeconomic conditions. A small amount of visitors potentially would be required to change their visitation plans while in the region, but any potential adverse effects would be negligible, and possibly would be offset by the beneficial effects resulting from visitors spending time in other areas and/or making arrangements for longer stays in the region. Visitation levels at the park overall likely would not change due to management at key features during peak visitation periods.

Regarding potential impacts to housing as a sub-element of the Socioeconomics topic, construction of pull offs, expanded and new parking areas, and other plan actions may result in a temporary influx of construction contractors and workers in the area. There may be short-term impacts on housing as workers would need to relocate to Moab if traveling from a remote location. However, these impacts would be negligible to minor and short- term to the local housing supply.

Cumulative Impacts Overall, implementation of Alternative B in combination with other past, present, and reasonably foreseeable future actions would not be expected to result in adverse impacts. Rather, long- term, beneficial impacts to regional socioeconomic conditions would be expected, and actions proposed under Alternative B would contribute appreciably to these effects.

Conclusions Implementation of Alternative B would be expected to create long- term beneficial effects on socioeconomic conditions in the region.



The proposed motorized interpretive tour would be an important contributor to the anticipated beneficial effect. Short-term beneficial socioeconomic effects likely would occur during the construction period of proposed improvements, while at the same time, there would be negligible to minor, short-term impacts to the local housing supply. Overall, long-term and short-term, beneficial cumulative impacts would occur. The National Park Service does not analyze socioeconomic values for impairment.

Land Use

Methodology

All available information on land use was compiled, including land use within Arches National Park, as well as surrounding land uses in Grand County and the City of Moab. The primary sources of information included the *Arches GMP* (1989), *BLM Grand Resource Area Management Plan* (USDI 1996), *VERP Implementation Plan* (USDI National Park Service 1995), *Moab/Grand County North Corridor Gateway Plan* (City of Moab and Grand County 2001), *Grand County General Plan Update* (Grand County 2003), *Grand County Land Use Code* (Grand County 1999), *City of Moab General Plan* (City of Moab 2001), and *City of Moab Zoning Code* (City of Moab 2004).

For purposes of this analysis, the thresholds of intensity for land use impacts are defined as follows:

Negligible: Relatively little change in land use would occur.

Minor: The proposed land use would be similar to existing uses and be in character with surrounding uses. It would not conflict with the designated use of the land as proposed under existing land use plans for the area.

Moderate: Land use changes would be within the allowable range of uses designated for the site by existing land use plans, but mitigation would be needed to avoid conflicts with other land uses.

Major: Development would change the type of land use and extensive mitigation would be necessary for the new land use to be compatible

with existing and surrounding development. May require modification to existing land use plans to accommodate use.

The duration of impacts on land use is defined as follows:

Short-term: occurs only during the six-year construction/implementation period.

Long-term: occurs after the six-year construction/implementation period.

Environmental Consequences

Alternative A – No Action

Impact Analysis Under Alternative A, the park would continue to manage existing transportation facilities in their current condition. Ongoing maintenance and operations activities and minimal improvements proposed in the park's GMP but not yet implemented would occur, on a case-by-case basis. There would be no changes to existing pull offs and parking areas other than continued road and parking area maintenance.

These ongoing activities, in combination with measures to mitigate impacts contained in the park's GMP, would result in no short-term, adverse impacts and no to negligible, long-term, adverse impacts on land use. Impacts are expected to be negligible or less because relatively little change is expected to occur to land uses in the park since most of the improvements proposed in the park's current GMP already have been implemented.

Cumulative Impacts Land uses in the park have been and would continue to be impacted by past, present, and reasonably foreseeable actions, including several projects completed under the current GMP (i.e. paving of the Delicate Arch road, constructing a new Visitor Center, park entry road improvements, etc.). These improvements have resulted in long-term conversion of parkland from undisturbed to developed uses. There are also several ongoing and planned projects in the park vicinity that would impact land use. For example, future development of land along US 191 between the



park entrance and Moab is guided by the *North Corridor Gateway Plan*.

Overall, actions described under Alternative A, combined with effects of other past, present, and reasonably foreseeable actions that would affect land use within the park and in the surrounding region, would result in negligible to minor, long-term, adverse cumulative impacts on land use. Alternative A would contribute to land use impacts in the park to a negligible level or not at all because very little change would occur.

Conclusions Under the No Action alternative, there would be either no or negligible, long-term, adverse impacts on land use in the park. Overall, long-term, cumulative impacts would be negligible to minor and adverse in the park and surrounding vicinity. There would be no impairment of park resources or values related to land use.

Alternative B – Preferred Alternative

Impact Analysis Alternative B would convert approximately 12,650 square feet of existing natural area to a developed parking area at the Sand Dune Arch Trailhead. The proposed development and reconfiguration of the parking area at this location would be similar to and in character with existing adjacent parking uses. The commitment of this land to a developed use is consistent with the GMP, and final design efforts would ensure that the parking area is configured in a way that minimizes impacts on the resources and values of Arches National Park. The 12,650 square feet of newly disturbed area would be offset by the proposed removal of 13,600 square feet of existing pavement and compacted social pull offs at parking areas (6,200 square feet at Devils Garden, 5,250 square feet at Sand Dune Arch, and 2,150 square feet at the Windows/Double Arch). These areas would be rehabilitated through protection, raking, contouring, and other measures and protected to encourage natural recovery. Long-term land use impacts would be adverse but minor as a result of Sand Dune Arch parking development and adverse but negligible at other parking areas proposed for improvements.

Alternative B proposes paving of 11,900 square feet of existing disturbed land to create 21 roadside pull offs for formal use, as well as retaining 5 existing pull offs in informal use. Land area disturbance would be offset by the proposed removal of 10,025 square feet of disturbed area at these locations and 191,664 square feet at more than 170 other existing social pull off areas in the park. These areas would be environmentally rehabilitated and protected to encourage their return to a more natural condition. The majority of land area to be paved at formalized pull offs has been previously disturbed due to existing social pull off activities. The commitment of this land to a developed use is consistent with the GMP. Final design of pull off improvements would minimize impacts on the resources and values of Arches National Park. Because formalized roadside pull offs would be similar to existing uses, the resulting long-term land use impacts would be adverse but minor.

Proposed traffic calming treatments, improvements to support motorized interpretive tours, and ITS components would not adversely affect land uses in the park because they would be installed in existing developed areas. However, these improvements would have a beneficial long-term effect on park land use by helping to manage traffic flow and by reducing congestion at the park's key visitor destinations thereby enhancing the visitor experience, and these actions reinforce the goals and objectives of the park's management plans.

Short-term, adverse impacts to land uses in the park during construction of proposed parking, pull off, traffic calming, and related improvements would be negligible to minor because construction activities would occur in previously disturbed areas along and within existing roadways.

Creation of a new centralized operation and maintenance facility in Moab to support motorized interpretive tours could result in short-term and long-term impacts to land use. The type and intensity of potential impacts would depend on the location of the facility in Moab, and whether the selected site is currently developed with other uses or undeveloped. Existing uses at



the selected site may need to be converted to accommodate a vehicle/bus storage area, maintenance facility, office, and fueling station. The level of impact intensity would depend on these and other variables. However, given the pattern of existing uses and zoning in Moab and its character as a developed, urbanized area, adverse long- term impacts would be expected to be negligible to minor assuming the proposed site design and development complies with existing City of Moab land use plans and zoning and building requirements and all other applicable local, state, and federal standards and requirements. Construction of new facilities in Moab would require a building permit. Short-term impacts during construction also would be expected to be negligible to minor.

Other proposed actions include continued partnerships with local and regional interests, expanded visitor interpretation and recreation opportunities (such as temporary shade structures and picnic tables), ongoing VERP monitoring, and implementing various visitation and congestion management strategies. Improvements associated with these proposed actions would be installed in developed parking and trailhead areas and, therefore, would have negligible, long- term, adverse impacts on land use.

Cumulative Impacts Past, present, and reasonably foreseeable projects within and in the vicinity of Arches National Park that would adversely impact land use under Alternative A would also apply to Alternative B. As with Alternative A, a number of past and present actions completed under the current GMP at Arches National Park have resulted in the long-term conversion of land in the park from undisturbed to developed uses. Long- term impacts resulting from these cumulative actions would range from negligible to minor.

Development authorized under the Moab General Plan and the North Corridor Gateway Plan would coincide with future planned and authorized improvements in Arches National Park. The US Department of Energy likely would proceed with its proposed clean up of surface contamination and implement a groundwater compliance strategy at the Atlas Mill and tailings site near the park entrance. These and other related projects would result in negligible to minor adverse land use impacts in areas outside park boundaries assuming development complies with existing land use plans and zoning requirements.

Overall, impacts described under Alternative B, combined with impacts of other past, present, and reasonably foreseeable actions affecting land use, would result in negligible to minor long- term, adverse cumulative land use impacts. Alternative B would contribute to land use impacts both within and outside the park. Alternative B's contribution to land use impacts inside the park would be negligible to minor. The intensity of this alternative's contribution to land use impacts outside park boundaries would depend on the function and use of the selected site in Moab for the new centralized operation and maintenance facility to support motorized interpretive tours, but would be expected to range from negligible to minor. Accordingly, overall, long- term cumulative impacts would be negligible to minor and adverse.

Conclusions Alternative B would result in long-term, negligible to minor adverse effects, as well as long- term beneficial effects on land use. Short-term adverse impacts to land use during construction would range from negligible to minor. Overall, long- term, cumulative impacts would be negligible to minor and adverse. There would be no impairment of park resources or values related to land use.



Public Involvement

Public involvement has been an important and integral component of the transportation planning process for Arches National Park. Key stakeholders from the local community and the region, park visitors, and the public-at-large have been involved since the onset of the process and have provided input on potential actions to address transportation related needs in the park and the surrounding region.

The public involvement process included stakeholder and community workshops, general public meetings, distribution of project information sheets, website postings, visitor travel surveys conducted in the park, and development of a project update newsletter that was mailed to parties of interest and posted on the park's website. Additional details related to each of these various outreach activities and tools are described below.

Project Information Sheets

The project information sheet has been an effective tool for keeping the public informed about the project. This informational two-page flyer was designed for public distribution and posting on the park's website. The project information sheet included a project description, schedule, meeting announcements, and contact information. Two updates were distributed during the course of the project. (Three editions of the project information sheets were created.)

Website Postings and Project Email Address

The Arches National Park website has also been used to update the public on the project status. Project information sheets and meeting announcements were posted on the website, as well as meeting notes and other project-related information. A specific email address was set up for this project and comments were received via

email and documented as part of the project record.

Project website:

<http://www.nps.gov/arch/pphtml/newsdetail15906.html>

Project email address: arches.tp@otak.com

Visitor Travel Surveys

During the spring and summer of 2003, comprehensive visitor travel surveys were conducted to gather data and information from the general public to help guide the planning process and learn about the general needs interests and concerns of park visitors related to transportation. The findings from these surveys are summarized in the Transportation Implementation Plan and Environmental Assessment and available as a separate document from Arches National Park. The planning team also conducted park employee and overnight camper surveys to gather specific information about their transportation needs, interests, and concerns.

Public Workshops and Meetings

Public workshops and meetings have been very successful in providing a forum for gathering input, ideas, and comments on development of the transportation plan. Two public workshop series were held in February 2003 and November 2003. During each of these multi-day series, evening public meetings were held. Meetings were advertised in the *Moab Times* and on the park's website. An additional public meeting will be held in Moab in the summer of 2006 to present the alternatives analyzed in this Transportation Implementation Plan and Environmental Assessment, including the proposed actions of the preferred alternative.

February 2003 Workshops and Public Meetings

During February 3-7, 2003, a week-long public involvement effort took place in Moab, Utah. Regional and local stakeholders were invited to attend small, interactive workshop sessions.



Stakeholders were grouped with “like interests” to facilitate non- confrontational and open discussions. A total of nine workshop sessions were conducted and included the following stakeholder groups:

- City of Moab
- Grand County
- Utah Department of Transportation
- Bureau of Land Management
- Recreational interests
- Economic development/chamber of commerce/tourism interests
- Tour/shuttle service interests

Each workshop session included a brief project presentation and informal discussion about transportation ideas for Arches National Park.

Two public meetings were held on February 6, 2003. One goal of the public meetings was to provide a venue for environmental scoping. Normally, a public scoping meeting is not required for an environmental assessment. However, at this earlier stage of the project it was not yet known if an environmental impact statement would be required, and the team felt it was important to gather as much public input as possible about elements of the environment to be considered during the planning process.

A press release announcing the public meeting and the anticipated environmental scoping discussion was advertised on January 23, 2003. The press release stated that the public was invited to attend either of the two identical public meetings, from 2:00 pm to 6:00 pm or 6:00 pm to 9:00 pm on February 6, 2003. The purpose of the meeting was to gather ideas and input on options and ideas being considered as part of the transportation plan development and to comment on elements that should be addressed by the scope of the environmental analysis.

A diversity of opinions and a wide range of comments were heard at the workshop sessions and public meetings. The public commented on a variety of topics related to transportation at

Arches National Park. The public commented on regional transportation, Arches National Park transportation, and the visitor experience at Arches National Park. Overall, the public was interested in making some changes at Arches National Park that would improve the visitor experience and to diversify the range of transportation options available to park visitors.

A majority of meeting participants was interested in a shuttle and/or tour program at Arches National Park. The public was also interested in providing more opportunities for hikers and bicyclists in the park. Most people also agreed that visitor experience is important, and minimizing crowding at key locations is essential in preserving visitor experience and protecting natural and cultural resources.

Some of the perspectives shared by meeting participants are highlighted below.

Comments Related to Transportation in Moab and the Region

- Two million people travel through the Moab area each year, most have their own car.
- Moab town representatives would like to see a shuttle system connect from town to the park.
- Tourism gets many calls for “car free” visitor information. Many want to know about the availability of bus tours to Arches National Park.
- A travel host program is in place; employees are trained to provide high quality service to tourists. This program should be expanded to area businesses, which are unofficial visitor centers for the town, park, BLM recreation lands, etc.
- Shuttle system should start in Moab.
- Need shuttle from I- 70 to Moab.
- The new UDOT multi- use path will enable bicyclists to access Arches; bicycling facilities at the park should be expanded.
- It’s a good idea for visitors to leave cars in town – a town- based shuttle would help to encourage the use of alternative modes of transportation.



Comments Related to Transportation Options at Arches National Park

- Need to assess the existing tour services in the Moab area.
- Bicyclist needs vary greatly. Bike lanes vs. bike paths - paths are preferred for families but more difficult to maintain, implement, fund, build, and acquire property for.
- There could be potential partnership opportunities with an internal shuttle route in the park and another route to and from Moab.
- Transportation planning should consider options for bicycles all the way through the park. The community will get behind bicycle solutions.
- How will a transportation plan affect existing commercial tours? Aim to create new opportunities.
- There is a great interest in linking non-motorized routes in Moab and vicinity; need additional funding to create the pedestrian/bicycle bridge over the Colorado River.
- One option would be an express bus from the Visitor Center to Delicate Arch.
- Driving through the park is one of the most important park experiences (maybe people do not want to get out of their car).
- Arches is not a bicycle- friendly park (currently) – roads are too narrow with steep inclines and RVs add congestion.
- Starting a shuttle in the park is a better option – a shuttle can make a loop through the park from the Visitor Center.
- Shuttle/tour companies know the best time to take visitors to the park. Shuttle service should be easy to implement in Moab – drivers/people are already here, licensed, and ready to go.
- Private partnerships could work for a shuttle program.

- Transit system will work for those who want to stay on the tour, as well as those who want to hike.
- Avoid diesel with shuttle and look at alternative fuels.
- Bicycles are a good alternative for transportation.
- Expect support for getting cars out of the park.
- There are times that a bicycle path would receive the most use. But it would not minimize traffic congestion in the park at peak visitation times.
- Many RV renters want to know if tours of the park are available.
- Need to move as many people through the park as possible while still providing them with a “world class” experience.

Comments Related to Visitor Management at Arches National Park

- Balanced Rock – large turn- over for vehicles. RVs take up too much space, which causes congestion.
- By 11:00 am, Delicate Arch parking is full, on peak days we have to station rangers to control traffic; their time should be spent on other efforts.
- Plan should look at ways to deal with “peak, peak” visitation flows.
- Delicate Arch trails are reaching VERP capacity. Nothing is being done about it though.
- Devils Garden parking lot fills up by 11:00 a.m. during peak, peak times. By noon, many people circle around the parking areas in search of a parking spot.
- Overcrowding at key features is a big problem.
- Places with crowds during peak times include Sand Dune Trailhead, Skyline Trailhead, Klondike Bluffs, and the junction of Windows and the main park road.



- It is important to preserve the visitor experience; crowding affects the ability to do this.
- Need to look at long- term priorities for the park.
- Why not treat the five key sites in the park with reserved parking? A set number of tickets could be issued per day then require overflow visitors to take a shuttle.
- Shuttle could be designed so as not to put key features over capacity with number of visitors (limit vehicle capacity and frequency of drop offs).
- Would like to see park consider a north entrance through Salt Valley. It would be closer to I- 70; could disperse people at both ends of the park.
- Is there a way to disperse visitation within the park to other arches in the park? If Landscape Arch was a one- way loop – there would be fewer people on the trail and a better experience.
- Mountain bike trails are not as critical as a family- friendly path.
- Sand Dune and Broken Arch are great locations but they have less parking – could disperse use to these areas.
- Timing of visitation is directly related to tourists' schedules and plans. Plans to disperse visitors over an entire day may not meet visitors' interests and desires.
- Focus of planning should be how to deal with increased visitation/dispersal to trails and prime visitor use areas.

November 2003 Public Meeting

A public meeting was also held on November 6, 2003. The purpose the meeting was to give the public an opportunity to view the visitor survey results and the existing conditions analysis. The public also provided input on possible transportation options and strategies for the park. The public meeting was held at the Castle Rock Inn in Moab 6:30 p.m. - 8:30 p.m. on Thursday

November 6, 2003. A wide range of comments were heard at the public meeting.

In discussion of potential tour services at Arches National Park, participants were supportive of the idea of tours for the general public. Tour operators in attendance wanted to be sure that new tour programs would not be competitive with existing tours operated through incidental business permits. Existing tour operators also expressed concerns about the high fees they are required to pay to take groups into the park.

Some participants were concerned that implementing additional reservations and ticketing at the park could get too complicated. Others were supportive of the idea if needed to protect resources and avoid overcrowding.

There was a strong interest in enhancing bicycling opportunities in the park if feasible. Public meeting participants expressed interest in widening shoulders and providing more opportunities for bicyclists, such as separate bike paths or multi- use paths. Although in response to the idea of providing bicycling shoulders, some participants were not supportive of widening park roads and concerned that widening might change the scenic character of the part and affect resources.

Meeting participants were supportive of options that would improve some of the existing social pull off areas (paving and formalizing them) but remove all others over time. Participants were concerned about the affects these social pull off have on park resources and scenic qualities.

A few perspectives from meeting participants are highlighted below.

- I have concerns about a reservation system. People come to Arches at a specific time. What will people do when they come here and find out that the park is already booked? This might not work for Arches.
- If you make the transportation system too complicated, you may discourage people from coming to the park at all. If you have an elaborate management scheme, you are going to have to evaluate the visitor experience. May end



up creating a “Disneyland” experience instead of a natural, spontaneous experience – that’s what people like about parks. People would rather have a spontaneous experience instead of picking a time to go to sites.

- I like bicycle lanes. I would bicycle in the park but I am nervous about the road and the cars. The park could use more hiking trails, like loops. That would also help disperse people throughout the park.
- I think a bike path or route without cars is a good idea too. A lot of people do not want to take a shuttle or make reservations. You (park team) need to maintain flexibility with a shuttle plan. Tour operators would need to call the park to make reservations. Most people like the driving/ sightseeing tour aspect of their visit – they would be satisfied with a motorized sightseeing tour of the park (as passengers in buses).
- It would help if Arches provided a guided tour.
- I would not want the roads widened. I would rather have traffic calming and a separated path for bikes.
- Formalizing some pull outs is a good idea. Some could be formalized, but others should be eliminated.
- Shuttles to specific sites should be free or nominally priced.

Newsletter

In October 2004, a project newsletter was distributed at the park, to community and regional partners, and also displayed on the park website. The newsletter included a project update, preliminary review of the alternatives to be analyzed in the Transportation Implementation Plan and Environmental Assessment, and the project schedule. The newsletter included the descriptions of the two alternatives in the plan: Alternative A, No Action, and Alternative B, the Proposed Transportation Implementation Plan (also the preferred alternative). Alternative B was labeled “Implementation of Improvements to Enhance Visitor Access and Visitor Experience”

in the newsletter. The newsletter also included a list of longer term options considered during the planning process.

Copies of all public involvement materials and newsletters have been retained in the project record.

Agency and Tribal Meetings and Consultation

The National Park Service has consulted with American Indian tribes as well as federal, state, and local agencies during the course of this project.

American Indian Tribes

The National Park Service distributed letters dated January 17, 2003 to American Indian tribes of the region. The letters provided information about the anticipated scope of the transportation plan and contact information. Letters were mailed to the following tribal representatives:

- Hopi Tribe, Kykotsmovi, AZ 86039
- Paiute Tribe of Utah (Letter returned)
- All Indian Pueblo Council (2 letters sent, both returned)
- Southern Ute Indian Tribe
- White Mesa Ute
- Ute Mountain Ute Tribe
- Ute Indian Tribe, Ft. Duchesne, UT 84026
- Navajo Area Office, Gallup, NM
- Zuni Cultural Resources Advisory Team (ZCRAT)
- Petuuche Gilber, Acomita, NM 87034
- Governor’s Office, Isleta, NM 87022
- Governor’s Office, Laguna, NM 87026
- Santa Ana Pueblo, Bernalillo, NM 87004
- Governor’s Office, Santo Domingo, NM 87052
- Governor’s Office. Cochiti, NM 87072



- Governor's Office, Jemez, NM 87024
- Sandia Pueblo, Bernalillo, NM 87004
- Governor's Office, San Felipe, NM 87001
- Governor's Office, Zia Pueblo, NM 87053
- Governor's Office, Nambe Pueblo, Santa Fe, NM 87501
- Governor's Office, Pojoque Pueblo, Santa Fe, NM 87501
- Governor's Office, San Juan Pueblo, San Juan, NM 87566
- Governor's Office, Tesuque Pueblo, Santa Fe, NM 87501
- Governor's Office, Picuris Pueblo, Penasco, NM 87553
- Governor's Office, San Ildefonso Pueblo, Santa Fe, NM 87501
- Governor's Office, Santa Clara, Espanola, NM 87532
- Governor's Office, Taos Pueblo, Taos, NM 87571
- Eight Northern Indian Pueblo, Inc., San Juan, NM 87566
- Five Sandoval Indian Pueblo, Inc., Bernalillo, NM 87004

Letters have been sent to tribal representatives notifying them of the availability of the Arches National Park Transportation Implementation Plan and Environmental Assessment.

National Park Service

Various resource specialists within the Intermountain Region of the National Park Service and at Arches National Park were consulted in the preparation of the Transportation Implementation Plan and Environmental Assessment. Documentation of these communications has been filed in the project records.

Bureau of Land Management

The Bureau of Land Management (BLM) manages millions of acres in the vicinity of Arches National

Park, and the agency has been involved as a major stakeholder throughout the transportation planning process. The BLM's Grand Resource Area encompasses all the land adjacent to Arches National Park. BLM representatives participated in multiple workshops at key stages in the planning process and provided information and data related to existing conditions in the region, recreation opportunities, visitor use patterns, and user surveys associated with BLM recreational lands.

BLM representatives assisted with identification of existing issues and considerations related to transportation in the region, desired conditions for transportation at Arches National Park and the surrounding area, and development of strategies and options achieving these desired conditions during workshop sessions.

A letter has been sent to the BLM notifying them of the availability of the Arches National Park Transportation Implementation Plan and Environmental Assessment.

Other Federal Agencies

Letters have been sent to other federal agencies notifying them of the availability of the Arches National Park Transportation Implementation Plan and Environmental Assessment, including the US Fish and Wildlife Service, NOAA Fisheries, and the US Army Corps of Engineers.

Resource specialists at the US Fish and Wildlife Services were consulted with in preparation of the Transportation Implementation Plan and Environmental Assessment. Documentation of these communications has been filed in the project records.

State Historic Preservation Officer

The Arches National Park archaeologist completed a Section 106 assessment for the proposed Transportation Implementation Plan on March 15, 2005. The field survey of each of the proposed pull off locations and parking areas did not identify any cultural resources within the project area of potential effect (APE).



The 1995 Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers states that *"repaving of existing roads or existing parking areas within previously disturbed areas may be reviewed internally by the National Park Service for Section 106 purposes, without further review by the Advisory Council or the State Historic Preservation Offices."* Arches National Park has determined that based upon the results of their field survey there would be no effect to cultural resources under the alternatives for activities undertaken within the park.

A copy of the Arches National Park Transportation Implementation Plan and Environmental Assessment has been sent to the State Historic Preservation Officer.

Utah Department of Transportation

The Utah Department of Transportation (UDOT) was a major stakeholder throughout the planning process. The project team met with state, regional, and local UDOT representatives during both workshop sessions in February and November 2003. UDOT also provided extensive information during the preparation of this plan, including information about their Intelligent Transportation Systems program and its relationship to other national parks, as well as information related to existing and future planned work near Arches National Park that could influence or have a relationship to transportation solutions being developed for the park.

Coordination with Local Governments

The City of Moab and Grand County have been key stakeholders throughout the planning process. These local agencies participated in the February 2003 and November 2003 workshop sessions. Both agencies also contributed to information in the development of this plan including lists of current and future transportation projects near and around Arches National Park.

Close coordination with local, regional, state, and federal partners would continue to be a priority under both alternatives in the Transportation Implementation Plan and Environmental Assessment.



Chapter 6

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Chapter 7

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In addition to the sources listed above, research related to existing tour programs provided throughout the National Park Service was conducted. A number of resources were referenced, including numerous websites and brochures.



**BIOLOGICAL ASSESSMENT
ARCHES NATIONAL PARK**

**Appendix to the
TRANSPORTATION IMPLEMENTATION PLAN
AND ENVIRONMENTAL ASSESSMENT**

Submitted to
Arches National Park
Moab, Utah

Prepared by
AMEC Earth & Environmental, Inc.
Kirkland, Washington

September 2006

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1.0 INTRODUCTION

1.1 Background

The purpose of this biological assessment (BA) is to address the potential effect of the proposed Arches National Park transportation implementation plan (TIP) on protected species listed as endangered or threatened under the federal Endangered Species Act (ESA). Because federal funds would be used to implement the TIP, consultation with the U.S. Fish and Wildlife Service (USFWS) is required under Section 7(c) of the act. Section 7 ensures that, through consultation (or conferencing for proposed species) with the USFWS, federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species, or result in the destruction or adverse modification of critical habitat.

1.2 Early Consultation

Prior to completion of this BA, AMEC Earth and Environmental, Inc., biologists consulted with Laura Romin and Tom Chart of the Endangered Species Program, U.S. Fish and Wildlife Service, Utah Field Office, regarding the scope of this document. Based on the project description provided and the low likelihood for any measurable adverse effects to protected species, a no-effect letter (NEL) was considered for this project. It was advised, however, that an abbreviated BA that documents justification that the project may affect, but is not likely to adversely affect, listed species would be most appropriate. This would address any doubts of whether there could be any effects and would ultimately expedite the environmental review of this project.

1.3 Project Purpose and Need

At Arches National Park in Grand County, Utah, the National Park Service proposes to implement a program of selected roadside pull off and parking-area improvements, motorized interpretive tours, intelligent transportation system applications, and other strategies. Other strategies include continuing partnerships with regional interests, expanding visitor recreation and interpretive opportunities, traffic-calming improvements, and various visitation- and congestion-management strategies such as promoting off-peak visitation and encouraging regional dispersal of visitation.

The purpose of the action proposed under this project is to ease traffic congestion, protect natural and cultural resources, enhance the visitor experience, improve visitor safety and accessibility, and offer visitors another way to access and experience the park through motorized interpretive tours.

This action is needed for a number of reasons:

- Frequent congestion at parking areas causing visitors to park off paved areas and to damage sensitive soils and vegetation
- Continuing concerns for visitor and traveler safety resulting from excessive speeds on park roads and conflicts with pedestrians seeking access to trails and other park destinations

- Diminished visitor experience caused by crowding along trails to key features and resulting concerns about degradation of natural resources
- Currently no general motorized interpretive or sightseeing tours provided at Arches National Park
- A general absence of coordination among the federal, state, and local agencies and other stakeholders to plan for and resolve regional transportation issues affecting a popular tourist destination

2.0 PROJECT DESCRIPTION

2.1 Location

The project action area is located within Arches National Park approximately 3 miles north of Moab, Utah (refer to Figure 1).

The park is located within the geologic region known as the Colorado Plateau, with elevations ranging from 4,085 to 5,653 feet above sea level. A large percentage of Arches National Park's land surface is exposed bedrock or shallow soil over bedrock with sparse vegetation cover. The arid climate of the area, with only 8 inches of annual precipitation, results in sparse vegetation and poorly developed soils. Large areas of slickrock cover constitute approximately 11 percent of the park and are largely devoid of soil and plant life. The Colorado River runs 10.7 miles along the southeast boundary of the park. There are two primary tributary systems to the Colorado River within the park: the Courthouse Wash drainage in the southwestern portion and the Salt Valley – Salt Wash drainage system draining the central, northern, and eastern portions of the park. These wash areas are relevant to note because they are the areas that provide riparian habitat within the park.

The park road system is the focal point for project activities and provides the public with access to the park along approximately 18 miles of paved roadway. At approximately Mile 4.8, the main park road crosses the main stem of Courthouse Wash. This point is more than 6 miles upstream of the confluence of Courthouse Wash and the Colorado River. The main road runs parallel to and then crosses Salt Valley Wash near Mile 13, more than 10 miles upstream of the confluence with the Colorado River. A branch road from the main road leads to Delicate Arch and crosses the main stem of Salt Wash near the Wolf Ranch site. This crossing is approximately 0.5 miles north of the confluence of Salt Wash with Salt Valley Wash and is about 8 miles upstream of the confluence with the Colorado River.

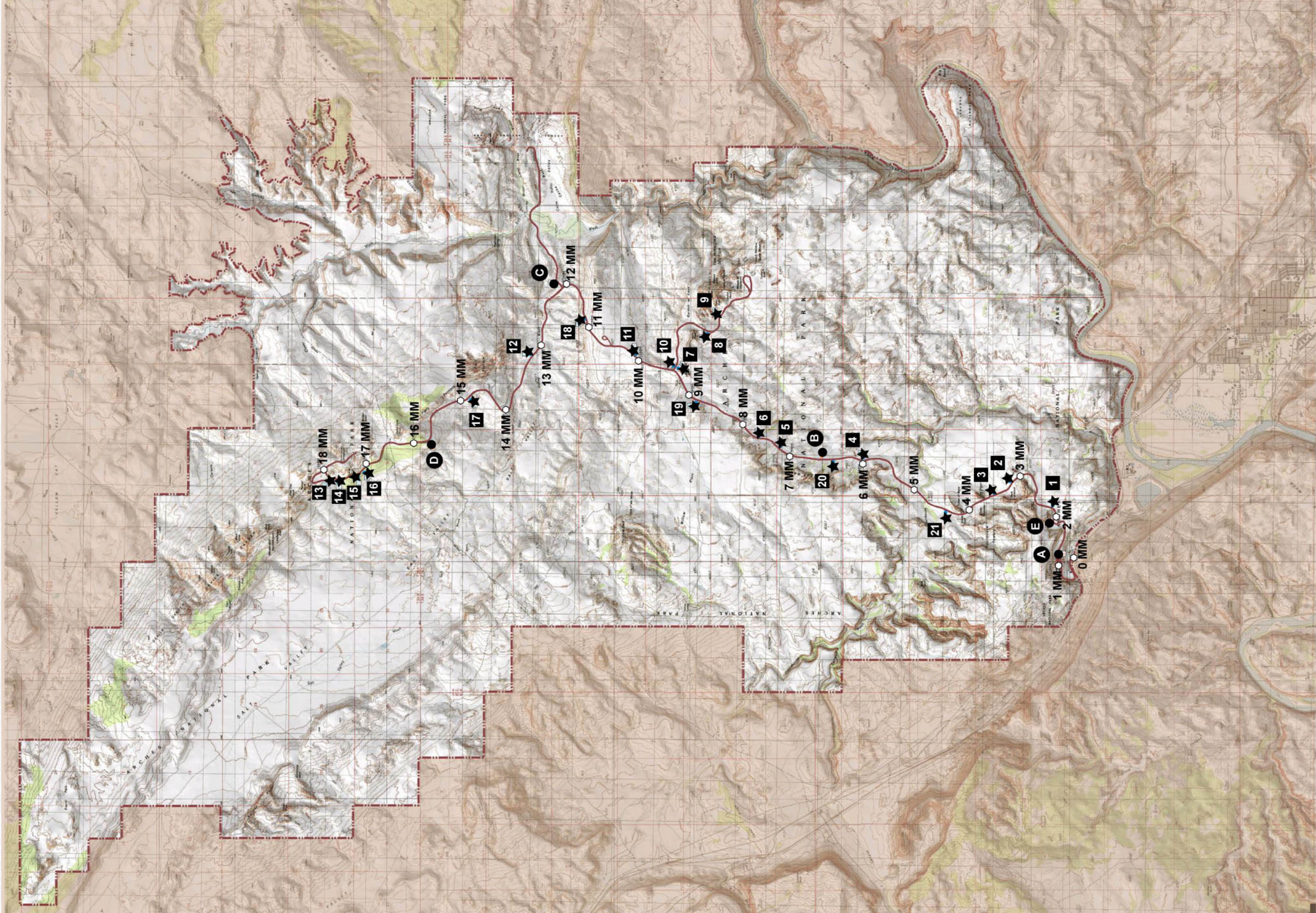
2.2 Project Overview

The preferred alternative for the Arches National Park TIP consists of the following elements: park roads and parking-area improvements, roadside pull off area improvement and rehabilitation, traffic calming, motorized interpretive tours (both inside and outside the park), intelligent transportation systems, partnerships with regional interests, protection of ongoing visitor experience and resources, and management of visitation and congestion. These elements are described in the following paragraphs.

2.2.1 Park Roads and Parking Areas

In several locations, parking would be reconfigured and improvements added to help alleviate congestion, reduce damage to natural resources, and improve overall operations, visitor access, and flow of travel in these areas. The parking-area improvements also would be needed to accommodate tour-bus parking and staging at certain locations in the park.

Roadside Pull-off Recommendations



★ Formal Pull-off - Recommendation to Improve

21 Formal Pull-off

● Social Pull-off - Recommendation to Retain or Minimally Improve

A Social Pull-off

○ Mile Marker

FIGURE 1

The Windows and Double Arch

The Windows and Double Arch parking areas would be redelineated through restriping to maximize parking. Redelineation of the parking areas would not result in additional paved areas or habitat loss. If parking areas are redelineated as recommended, there would be an opportunity to return approximately 2,150 square feet (.05 acres) of currently paved area to natural landscape by removing pavement and rehabilitating through protection, raking, and contouring.

Wolfe Ranch and Delicate Arch Trailhead

A tour bus drop-off and pick-up zone would be delineated through striping and signing within the existing paved surface to accommodate motorized interpretive tours.

Delicate Arch Viewpoint

Because the Delicate Arch Viewpoint parking area operates at less than full capacity most of the time, space at the west end of the parking lot could be converted to a staging area for motorized tour vehicles that have dropped tour groups off at nearby sites elsewhere in the park (e.g., Wolfe Ranch and Delicate Arch Trailhead, Fiery Furnace, Devils Garden).

Sand Dune Arch

A new parking area would be developed in the vicinity of the existing trailhead parking pull off. The new parking area would include 15 perpendicular spaces and four larger, parallel spaces for recreational vehicles (RVs) or eight regularly sized vehicles. Construction of the new parking area would result in loss of approximately 12,650 square feet (0.29 acres) of natural landscape, including soils and vegetation. Current off-road use would be eliminated and the area rehabilitated.

The new parking lot would be designed to fit sensitively into the natural setting and landscape, minimizing impacts to soils and vegetation and avoiding impacts to surrounding rock features. The design would strive to balance cut-and-fill earthwork and minimize the level of earthwork to the greatest extent possible. The selected site would require the least amount of grading and earthwork for construction and would help improve sight distance for ingress and egress from the main park road. The proposed area to be improved includes an area that has been previously disturbed by extensive social trailing. In addition, as part of construction of the new parking area, the existing roadside-parking area would be removed and 5,250 square feet (0.12 acres) of currently paved and disturbed areas would be protected and rehabilitated. The proposed improvements would help to minimize new disturbance by focusing access, parking, and trail use in a more confined, formalized area.

Skyline Arch Roadside Parking and Pull Off Area

The Skyline Arch roadside-parking and pull off area would be improved with five additional outbound parking spaces constructed by shifting the centerline of the main road to the east. Existing inbound parking would be better delineated and striped to discourage perpendicular parking, which is currently a problem at this location. A crosswalk would be located between the inbound and outbound parking areas for safe pedestrian travel.

Devils Garden

All inbound and outbound wide spots and social pull off areas around the entrance to Devils Garden would be removed and treatments such as boulders, curbing, or fencing would be added to deter social roadside parking occurring in this area. Approximately 6,200 square feet (0.14 acres) of existing paved and compacted social-parking areas would be removed and rehabilitated.

2.2.2 Roadside Pull Offs

An analysis of existing formal and social roadside pull off areas completed in 2004 for Arches National Park recommended that 26 pull offs be retained of the more than 200 locations being used as social pull off areas in the park. Of these, 21 would be formally improved with paving, extruded curbing, fencing, rocks placed at outside edges of pavement in some cases, and advanced signing. The other five would be retained as unpaved, informal pull offs. The five informal pull off locations would remain in their current condition with minimal improvements that include minor regrading at some locations. Roadside pull off locations throughout the park that either would be formally improved and paved, or would be retained as unpaved informal pull offs, are depicted in Figure 1.

In many cases, the area that has already been affected by social pull off activities is much greater than the area needed to accommodate any formalized pull off improvements. These existing disturbed areas would be rehabilitated through various treatments. Considering the total area to be formalized, as well as the total area to be rehabilitated at the pull off locations, there would be a net habitat loss area of approximately 1,875 square feet (0.04 acres). This net calculation includes 11,900 square feet (0.27 acres) of area already mostly disturbed that would be improved for formal pull off use, minus approximately 10,025 square feet (0.23 acres) of already disturbed area that would be rehabilitated.

Over time, Arches National Park would close the social pull off locations not proposed for formal improvements or proposed to be retained as unpaved, informal pull offs. There are more than 170 of these locations that would be closed to use. Motorists would be prohibited from using these pull off areas through physical barriers such as ditching, placement of boulders, and, in some cases, fencing, signing, and more intensive monitoring and patrolling. In most cases, raking and contouring would be implemented to help speed the process of natural recovery in these areas. These activities would result in rehabilitation of approximately 191,664 square feet (4.4 acres) of currently disturbed or affected landscape at the park.

It is anticipated that pull off improvements and rehabilitation efforts would be implemented within the next 6 years. Implementation of this work would be contingent upon the availability of funding for construction work and for staff time to direct improvements and rehabilitation efforts, to monitor effectiveness, and to intensify patrols.

2.2.3 Traffic-Calming Improvements

Traffic calming includes various strategies and physical improvements to reduce the traveled speed on roadways while maintaining vehicular capacity. The most appropriate locations for physical improvements to implement traffic-calming at the park are in advance of and at intersections, roadside pull offs, pedestrian crossings, and trailhead areas. Traffic-calming applications would include elements such as raised pavement markers, pavement texturing, or rumble strips in advance of these areas. Changes in pavement coloring (different from the asphalt concrete surfaces of the park's existing roadways) in advance of these areas and at pedestrian crossings also could be effective in traffic-calming. Other treatments include signs directing drivers to slow crosswalk stripes and other elements that would attract drivers' attention with minimal to no intrusion on the scenic values of the park.

2.2.4 Motorized Interpretive Tours

If planned, programmed, and implemented appropriately, motorized interpretive tours would encourage expanded visitor experiences and visitation to certain areas in the park while reducing congestion at some of the more crowded features. Potential partnerships between Arches National Park and private tour operators would facilitate the implementation of motorized interpretive tours. The Arches National Park TIP outlines the options for developing such partnerships.

Facilities and Services Outside the Park

The TIP recommends that maintenance and operations facilities for motorized interpretive tours be located at a Moab site associated with the private tour operator's business. These facilities would be within the Moab urban area. Necessary maintenance and operations facilities to support a motorized tour service would include the following:

- Tour bus and vehicle storage area (could be indoor or outdoor)
- Tour bus and vehicle maintenance facility with washing station, equipment, and parts storage area and bus barn for repairs
- Management and operations offices and facilities (e.g., work spaces, dispatch facilities, drivers' lockers, lunch room, restrooms)
- Fueling station and fuel storage area
- Ticketing facilities (could be multiple sites and could include availability at visitor centers, hotels, and other sites tied together through Internet communications)
- Park-and-ride facilities (could be multiple sites and could include partnerships with local hotels, employers, etc., to use available parking areas in Moab as park-and-ride or tour bus drop-off and pick-up locations)

These facilities may be or may not be located on federal land and/or may be or may not be funded in full or in part by federal funds. These details are not known at this time. If the National Park Service considers actions or participates as a partner in locating maintenance facilities on lands other than those that are federally managed, appropriate environmental compliance activities consistent with the National Environmental Policy Act and Section 106 NHPA will be undertaken.

Facilities and Services Inside the Park

Facilities and services that may be needed inside Arches National Park for motorized interpretive tours include time-limited parking and staging areas for visitor drop-off and pick-up at a variety of sites within the park. Recommended sites include the Visitor Center, Moab Fault Pull off, Park Avenue Trailhead, La Sal Viewpoint, Courthouse Towers, Petrified Dunes, Balanced Rock, Windows, Panorama Point, Delicate Arch Viewpoint, Fiery Furnace, Sand Dune Arch, and Devils Garden.

Tour vehicles would be able to use existing pull off configurations and parking areas for tour passenger loading and unloading, and no new facilities would be constructed. To accommodate tour vehicle pick-up and drop-off at these locations, some minor configurations of pavement striping and marking in existing parking and pull off areas may be needed. No new pavement or improvements outside areas already developed would be needed.

2.2.5 Intelligent Transportation Systems

Intelligent transportation systems (ITS) include the application of computers, communications, and sensor technology to multimodal transportation systems and facilities. When integrated into the transportation system infrastructure, and in vehicles themselves, these technologies help monitor and manage traffic flow; reduce congestion; provide alternate routes to travelers; enhance productivity; and save lives, time, and money.

The recommended actions for ITS improvements in Arches National Park that would be implemented within the next six years include the following:

- Integrate Arches visitor information with Utah's statewide 511 system
- Enhance the existing highway advisory radio (HAR) system
- Enhance the use of closed-circuit television (CCTV) real-time footage of the entrance station for in-park monitoring, security, and traffic counting
- Distribute the full Arches ITS study to regional stakeholders
- Enhance the use of the Arches National Park Web site information to broaden awareness about travel and parking conditions inside the park and to distribute visitation to off-peak times or to less congested areas of the park.

2.2.6 Partnerships with Regional Interests

The TIP recommends continued partnerships between Arches National Park, other federal agencies such as the Bureau of Land Management (BLM), state agencies such as Utah Department of Transportation (UDOT) and Utah State Parks, and local and regional interests such as the City of Moab and Grand County to ensure more effective long-term management of tourism and visitation patterns and the regional transportation system.

2.2.7 Ongoing Visitor Experience and Resource Protection

Ongoing monitoring of visitor experience and resource protection indicators and standards at key features within the park would be an important tool for park staff. Ongoing monitoring would require annual operations funding for the park to support the program. The ability for park visitor experience and resource management staff to determine if standards are being met can

only occur through monitoring. Analysis of the results of annual monitoring would assist park staff in making sound decisions related to future visitor use and transportation management strategies and actions.

2.2.8 Visitation and Congestion Management

As park visitation continues to grow and individual features continue to experience overcrowding during peak visitation periods, there will be a need to implement various types of visitation- and congestion-management strategies. The TIP recommends consideration of a number of alternative strategies, including dispersal of regional visitation, promotion of off-peak visitation, promotion of motorized tours, promotion of advanced trip-planning, pricing incentives, increased management of key features during peak visitation such as the popular Fiery Furnace area, and dispersal of visitation to less congested areas of the park.

3.0 SPECIES OCCURRENCE AND CRITICAL HABITAT

A review of literature, park records, and other available resources (NPS 2004; UDWR 2005a; UDWR 2005b; Utah Native Plant Society 2004) current as of October 8, 2005, indicated that the park supports one federal threatened bird species, the bald eagle (*Haliaeetus leucocephalus*) and the following five federal endangered species that include one bird and four aquatic species:

- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- bonytail chub (*Gila elegans*)
- Colorado pikeminnow (*Ptychocheilus lucius*)
- humpback chub (*Gila cypha*)
- razorback sucker (*Xyrauchen texanus*)

3.1.1 Bald Eagle

USFWS has designated habitat for the bald eagle, including the park and surrounding areas. Eagles use tall riparian vegetation along rivers for roosting and summer nesting.

3.1.2 Southwestern Willow Flycatcher

Habitat for the willow flycatcher includes riparian areas along the Colorado River and its tributaries.

3.1.3 Colorado Pikeminnow and Razorback Sucker

USFWS has designated the Colorado River and its floodplain, for the segment adjacent to Arches National Park, as critical habitat for Colorado pikeminnow and razorback sucker (USFWS 2005). This includes the Colorado River and its confluence with Courthouse Wash and Salt Wash to the point where the spring floods of the Colorado back up into these tributaries. The locations of these critical habitats, however, are several miles outside of the area that could be affected by the TIP (Valdez 2005).

3.1.4 Bonytail Chub and Humpback Chub

Bonytail chub and humpback chub prefer habitat in steep-walled canyons. No steep-walled canyons are located in the park, and critical habitat is not designated within 60 miles upstream or downstream from the park (Chart 2006).

3.1.5 Mexican Spotted Owl

The Mexican spotted owl (MSO; *Strix occidentalis lucida*) was also considered for inclusion in this BA because the 1997 and 2000 Spotskey and Willey models for MSO habitat indicated several polygons of potential habitat inside Arches National Park. The majority of potential

habitat is along the Colorado River, mainly beyond park boundaries. One linear polygon of potential habitat was identified within park boundaries and was located south of the Delicate Arch Viewpoint, roughly parallel and south of Cache Valley (Whittington 2005).

Several experts were contacted regarding the presence of MSO in Arches. Arches National Park Biologist Charlie Schelz has surveyed much of the park for several years; his wife, Sonya Daw, a seasonal biological technician, has done extensive riparian bird surveys in the Courthouse Wash watershed; and Park Ranger Gary Salamacha is an avid birder in the park. None of these staff has detected the presence of MSO (Schelz 2005). Dr. David Willey, a member of the MSO Recovery Team, has not detected the MSO during two years of his surveys in Arches (Willey 2005).

3.1.6 Plants

According to Larry England of the USFWS, there are no listed plants of concern with regard to the TIP. One listed plant species, *Cycladenia jonesii*, has been found in riparian areas associated with the Colorado River outside the park, but has not been found within the park. Colorado River riparian areas are several miles outside of the project area (Charles Schelz, Southeast Utah Group Ecologist, National Park Service, personal communication to Dave Wood, Southeast Utah Group Planner, National Park Service, 2006).

4.0 ANALYSIS OF EFFECT OF THE ACTION

Direct and indirect impacts of the preferred alternative for the Arches National Park TIP on the species described in section 3 are described in the following paragraphs. Direct effects are those that occur directly to the species of concern at the time of the action,; indirect effects are those that occur to habitat or that occur indirectly to the species after the action.

4.1 Park Roads and Parking Areas

Noise and other activities undertaken during construction and rehabilitation of existing and new parking areas may have a short-term (a few days during daylight hours for clearing, grading, and paving) adverse impact on terrestrial wildlife by causing animals, including T&E species, to avoid project areas. New parking areas could reduce the area of habitat.

Bald Eagles

No direct impact to bald eagles would occur due to construction. The impact of noise and other construction activities would be minor for bald eagles because this species does not frequent these locations, which are already disturbed by park visitors.

Indirect long-term effects would result from the net loss of as much as 0.25 acre (approximately 6,300 to 9,300 square feet) of bald eagle potential foraging habitat where eagle prey may occur. For bald eagle foraging, the affected area is negligible compared to the remainder of alternate habitat available throughout the park and surrounding public lands. Therefore, indirect effects to bald eagles would be negligible.

Mexican Spotted Owl

As stated earlier, the likelihood of MSO existence within the park is low, and thus direct impacts would be very unlikely. The one potential habitat polygon is more than 0.5 miles from any proposed activity.

Southwestern Willow Flycatcher

Existing and proposed new parking areas are not within 4,000 feet of willow flycatcher potential habitat (riparian vegetation). This is adequate distance to consider the project to have negligible possibilities of disturbing flycatchers or their habitat. There is no road or parking area construction planned in locations that could directly impact Courthouse, Salt, or Salt Valley washes or their riparian areas. Potential impacts to water quality from increased erosion during construction potentially could indirectly impact riparian vegetation. Use of construction best management practices (BMPs) to control erosion would ensure that this impact would be negligible.

Aquatic Species

Direct effects to aquatic species would not occur because there is no road or parking lot construction planned in aquatic habitats. Use of construction BMPs to control erosion would ensure that any effects on surface waters and potential indirect impacts to aquatic species and their associated habitat would be negligible.

4.2 Roadside Pull Offs

Noise and other activities undertaken during construction and rehabilitation of proposed roadside pull offs may have a short-term adverse impact on terrestrial wildlife by causing animals to avoid these areas. This impact would be discountable, however, because it would not have a principal effect at the population level on wildlife resources and habitat. For roadside pull offs, there would be a net-area habitat loss of approximately 1,875 square feet (0.04 acres). This small area is due to compensation by rehabilitation of social pull off areas.

Bald Eagles

Bald eagles would not be measurably affected during construction or after construction because of the dispersed distribution of pull off construction sites throughout the park, the fact that the majority of these sites are already disturbed and subject to human activity, and because these areas represent an negligible fraction of the total foraging habitat.

Direct long-term adverse impacts at pull off areas would result from loss of a small amount of habitat (1,875 square feet; 0.04 acres) for burrowing and ground-nesting species that potentially would be foraged on by bald eagles. However, this area is already heavily disturbed.

Although impacts on wildlife would be detectable because of displacement and habitat removal, these effects would be concentrated in areas of proposed construction. Effects on individuals of a given species would not have an adverse impact on overall parkwide populations. Furthermore, alternate habitat for these species is available throughout the park. Therefore, the action is not likely to adversely affect bald eagles.

Mexican Spotted Owl

As stated earlier, the likelihood of MSO existence within the park is low, and thus direct impacts would be very unlikely. The one potential habitat polygon is more than 0.5 miles from any proposed pull-out rehabilitation.

Southwestern Willow Flycatcher

Pull off locations are at least 1,000 and 2,000 feet from potential riparian habitat, and construction would not affect riparian areas.

Aquatic Species

The effects of construction and rehabilitation of roadside pull offs will be discountable for listed fish. No fill material would be placed in or removed from any surface waters, and no in-water activities would be required for construction in the pull off areas.

During construction, there would be potential for soil erosion and sedimentation that could indirectly affect fish habitat in the park's streams. Areas of improvement that are located in the vicinity of the park's two streams include formal pull offs 4 and 21, near Courthouse Wash. Use of construction BMPs to control erosion would ensure that any effects on surface waters and their associated listed fish habitat, which lies several miles downstream, would be discountable. There are no plans to withdraw surface water for water-down or dust abatement, and water regimes would not be disturbed.

Importantly, there would be a large decrease in total impervious surface area with full project implementation of pull off rehabilitation, restoring as much as 4.4 acres. Thus, indirect effects to stream habitats due to the negative effects of impervious surface would be greatly attenuated with project implementation. In summary, short-term and long-term direct and indirect impacts on aquatic species would be negligible.

4.3 Traffic-Calming Improvements

Traffic-calming measures would include advance warning signs, pavement texturing, pavement coloring or markers, rumble strips, and other techniques for slowing traffic in appropriate areas such as pull offs, pedestrian crossings, and trailheads. Such measures would have no effect on aquatic or terrestrial species or their habitats.

4.4 Motorized Interpretive Tours

Development of a new, centralized operation and maintenance facility to support motorized interpretive tours is recommended. Although the type and magnitude of impacts to fish, wildlife, and habitats would depend on the specific site location, effects are expected to be nonexistent or short-term and would be discountable. Construction would comply with City of Moab policies and regulations governing the protection of wildlife habitat. Motorized tours would have negligible impact to threatened or endangered species.

4.5 Intelligent Transportation Systems (ITS)

Short-term ITS recommendations would help to monitor and manage traffic flow and reduce congestion at the park's major visitor destinations. Direct and indirect effects on fish, wildlife, or habitat would be discountable.

4.6 Partnerships with Regional Interests

Because there are no specific improvements recommended by the TIP for implementation under this stage, there would be no effects on fish, wildlife, or habitat at this time.

4.7 Ongoing Visitor Experience and Resource Protection

Because there are no improvements recommended by the TIP for this initiative, there would be no effect on fish, wildlife, or habitat.

4.8 Visitation and Congestion Management

No new facilities would be located within critical habitat areas. These strategies would have no effect on threatened or endangered species because they would effectively work to reduce the numbers of vehicles and attenuate impacts to many areas. Any improvements recommended by the TIP (such as picnic tables and shade structures) would be installed in already developed pull off or parking areas. Therefore, there would be no effect on fish, wildlife, and habitat.

Shifting visitor use from traditionally congested areas to traditionally noncongested areas could result in impacts to sensitive species if the traditionally noncongested areas functioned to provide critical habitat and if the shift introduced new disturbance to habitats and species. The specific alternative strategies have not been detailed; however, the development of these

strategies would avoid introducing new disturbance and would avoid critical habitat such as riparian areas.

5.0 AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

This section identifies proposed impact avoidance, minimization, and conservation measures for the preferred alternative, as these items relate to ESA-listed species. These measures would be implemented to reduce the alternative's potential effects on natural resources, cultural resources, visual resources, and visitor use and experience. In addition to the measures identified subsequently, mitigation measures identified in the "Arches National Park General Management Plan/Development Concept Plan and Environmental Assessment" (NPS 1989) are incorporated by reference and will continue to be implemented throughout the park.

As outlined in the Transportation Implementation Plan and Environmental Assessment, to avoid adverse impacts resulting from the proposed project, the following measures would be implemented:

- BMPs would be used for all phases of construction activity, including preconstruction, actual construction, and postconstruction.
- A preconstruction meeting would be held to inform construction contractors about important impact topics and natural resource concerns of the park.
- A rehabilitation plan would be developed in conjunction with the construction documents of the park.
- Disturbance to vegetation would primarily be contained in previously disturbed areas or within narrow construction limits. Whenever practicable, soils and plants affected by construction would be salvaged for use in site restoration. Any introduced plantings would use native species and would strive to reconstruct the natural spacing, abundance, and diversity of native plant species.
- Reclaimed areas would be monitored annually to determine if rehabilitation efforts have been successful or if additional rehabilitation efforts are necessary.
- Ground disturbance and site management would be carefully controlled to prevent undue damage to vegetation and soils and to minimize air, water, soil, and noise pollution.
- Equipment and material staging and storage, as well as vehicle turnarounds, would be confined to existing disturbed areas along park roadways.
- Protective fencing and barricades around construction sites would be provided for safety and to preserve natural and cultural resources adjacent to construction areas.
- Effective stormwater-management measures specific to the construction sites would be implemented, and appropriate erosion and sediment control measures would be in place at all times.
- Construction equipment would be maintained in satisfactory operating condition, be equipped with required safety components, and not be leaking hazardous liquids or emitting hazardous or undesirable fumes at levels greater than allowable local air quality legal limits.
- Care would be taken to ensure that construction equipment and all construction materials imported into the park are free of exotic or noxious plant species. The

construction contractor would be required to wash construction vehicles prior to their entry into the park to remove weed seeds.

- Fugitive dust emissions during construction would be minimized by application of water to the construction areas.
- Through the use of BMPs for runoff control, reconfigured and new parking facilities would be designed to minimize long-term effects on water quality.
- Measures to mitigate the loss of biological soil crusts at the Sand Dune Arch Trailhead parking site would be identified and finalized during the detailed design phase. Measures may include restoration of a partially disturbed soil crust area in another part of the park to compensate for the on-site loss, or using soil crust mined (i.e. excavated and removed from the development site) and re-establishing it on another suitable site in the park.
- Elements of the TIP undertaken in Moab would comply with applicable regulations and policies, including local grading and stormwater regulations, local policies and regulations governing the protection of natural resources, and local and state noise regulations.

6.0 CONCLUSIONS

Based on its evaluation of potential effects, the National Park Service concludes that the Arches National Park Transportation Implementation Plan would result in a discountable probability of take of any listed species. It is further concluded that the TIP may affect, but is not likely to adversely affect, bald eagle, southwestern willow flycatcher, bonytail chub, Colorado pikeminnow, humpback chub, or razorback sucker. The TIP will have no effect on MSOs because it is unlikely that they exist in the park.

The National Park Service concludes that the TIP may affect, but would not likely adversely affect, the designated critical habitats of the Colorado pikeminnow and razorback sucker. The TIP will have no effect on critical habitat for bonytail and humpback chub because there is no designated critical habitat for these species within 60 miles of the proposed project. The TIP will have no effect on critical habitat for MSO because no habitat occurs within area of the proposed project.

7.0 REFERENCES

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Conversation Record

Date	September 28, 2005	File no	5-91M-15296-0
To	Mark Pedersen, AMEC	Project	Arches NP EA
From	Jeff Troutman, NPS Chief, Resource Management Division Moab, UT		
Tel	(435) 719-2135		
Subject	Mexican Spotted Owl Habitat		

I called Jeff regarding ESA protected species in Arches NP. I briefly described the proposed transportation project. I recited the list we are considering: bald eagle; Southwestern willow flycatcher; bonytail chub; Colorado pikeminnow; humpback chub; and razorback sucker. He said this list appears to be sufficient.

He told me that he doesn't think we have a Mexican spotted owl issue in Arches.

He recommended I talk with Charlie Schelz, a NPS biologist who has done extensive surveys in Arches.

Conversation Record

Date	September 29, 2005	File no	5-91M-15296-0
To	Mark Pedersen, AMEC	Project	Arches NP EA
From	Paul West Wildlife/Wetlands Biologist		
	Salt Lake City, UT		
Tel	(801) 965-4672		
Subject	Scope/level of effort for BAs		

I contacted Paul regarding his experience with USFWS in preparation of Biological Assessments (BA) for ESA species for road widening projects. I related to him the extensive level of detail required by Oregon and Washington (that deal with listed salmon) and asked about the scope and detail for Utah. He said most of the time for routine types of projects that a 3 to 5 page BA in the form of a letter was typically acceptable. He forwarded me an example that included in-water work and the list of BMPs that would result in a determination of May Effect, Not Likely to Adversely Affect.

Conversation Record

Date	September 30, 2005	File no	5-91M-15296-0
To	Ken Charm, AMEC	Project	Arches NP EA
From	Laura Romin , USFWS Endangered Species Program Coordinator West Valley City, UT		
Tel	(801) 975-3330 x142		
Subject	Arches BA		

My contact at USFWS in the Salt Lake City office is Laura Roman. She explained that what we (AMEC) usually delivers as a NEL/BA is what they would expect. I inferred that they are more liberal when defining a no effect call as the threat of environmental law suits is not as great as it is in Washington or Oregon. From our conversation, I do not think that a 2 page BA is appropriate for this project.

It'll probably be next week (Tues) before she can find a BA to send to us, as she will be out of the office on Monday.

She'll probably review this one when it comes in, however, all letters should be addressed to the Field Supervisor, Henry Maddux. All T& E documents come directly to her first, but should be addressed to Henry.

Conversation Record

Date	October 3, 2005	File no	5-91M-15296-0
To	Mark Pedersen, AMEC	Project	Arches NP EA
From	Tom Chart, USFWS Fishery Biologist West Valley City, UT		
Tel	(801) 975-3330 x144		
Subject	Arches BA		

At the suggestion of Jeff Troutman (Chief, Resource Management Division, Arches NP), I called Tom to summarize the main elements of the Arches NP Transportation Implementation Plan, verify the protected species involved, and to discuss whether we would need to prepare a BA or if we could comply with the ESA with a No Effect Letter.

He indicated the species we intended to cover in our document should be adequate for the Service to make an effects determination. He thanked me for taking the time to coordinate, and will follow this up with an email.

Conversation Record

Date	October 3, 2005	File no	5-91M-15296-0
To	Mark Pedersen, AMEC	Project	Arches NP EA
From	Tom Czapla, USFWS Upper Col. R. ESA Program Denver, CO		
Tel	(303) 969-7322 x228		
Subject	Arches BA		

I called Tom to obtain information on the protected fish species involved at Arches NP. I summarized the main elements of the Arches NP Transportation Implementation Plan for him. He recommended I contact Jeff Troutman at Arches NP and USFWS fish biologist Rich Valdez for site specific information on the fish species.

He indicated the fish species we intended to cover in our document should be adequate for the Service to make an effects determination.

Conversation Record

Date	October 4, 2005	File no	5-91M-15296-0
To	Mark Pedersen, AMEC	Project	Arches NP EA
From	Rich Valdez, USFWS Fish Biologist Moab, UT		
Tel	(435) 752-9606		
Subject	Listed fish within Arches National Park		

Rich left me a voicemail message responding to my query regarding the potential presence of listed fish species within Arches National Park and more specifically, near the road system within the park. He informed me that there were no listed fish in the streams in Park, except during heavy flooding events in the spring when the waters of the Colorado back up about ¼ mile into the Salt Wash confluence. At those times, pikeminnow may be present in the flooded areas.

Conversation Record

Date	October 17, 2005	File no	5-91M-15296-0
To	Ken Charm, AMEC	Project	Arches NP EA
From	Larry England, USFWS		
	West Valley City, UT		
Tel	(801) 975-3330 x138		
Subject	Listed plants within Arches National Park		

I spoke with Larry regarding the potential presence of listed plant species within Arches National Park and more specifically, near the road system within the park. He informed me that there is only one listed plant species within the park, *Cycladenia jonesii*, and that it only grows adjacent to the riparian area along the Colorado River along the eastern boundary of the park. There are no known listed plants near the road system within Arches National Park boundaries.

Conversation Record

Date	October 20, 2005	File no	5-91M-15296-0
To	Mark Pedersen, AMEC	Project	Arches NP EA
From	Diana Whittington, USFWS Energy/Migratory Bird Lead West Valley City, UT		
Tel	(801) 975-3330 x128		
Subject	Mexican Spotted Owl Habitat		

I had sent Diana a copy of the figure showing the pull offs to be improved and brief project description. This was a follow-up call to see if she had any additional advice regarding spotted owl habitat. Her main concern was keeping activity (construction and people access at least a half mile from any nest sites and the canyon rims. If construction is only done during the day, disturbance to owls would be low risk. The breeding season is March 1 through August 31.

The Arches Modeled Habitat shows the Park road (spur going to the Window Section) may be within 0.5 mi. of some predicted habitat. She wanted to know if Park staff had surveyed this area. I mentioned to her I had been trying to contact Charlie Schelz (NPS) for some time to provide that information.

She said if we could arrange to have a GIS layers (at least topography) for that road spur vicinity, she could assess the situation (proximity to canyon rim) and advise me.

She also agreed to send me a copy of the two MSO habitat models and how to use them in the Section 7 process.

Conversation Record

Date	October 24, 2005	File no	5-91M-15296-0
To	Mark Pedersen, AMEC	Project	Arches NP EA
From	Charlie Schelz, Biologist National Park Service Moab, UT		
Tel	(435) 719-2135		

Subject Mexican Spotted Owl Habitat

Charlie has done surveys primarily in Canyonlands NP and he has found a number of owls there. He has spent a number of years in Arches, but has never seen any MSO. His wife has done extensive bird riparian surveys in the vicinity of Courthouse Wash, and never heard or seen any owls.

He said that one of the Arches Park Rangers, Gary Salamacka, is an avid birder and has never seen any owls in Arches.

Charlie called Dr. Dave Willey, who is on the MSO Recovery Team. Dave said he had surveyed Arches National Park extensively over a two year period from 1995 to 1996, and found no owls.

Our conclusion is that that probability of owls being in the park is insignificant.